EDISON ELECTRIC INSTITUTE BULLETIN

FEBRUARY, 1939

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EDISON ELECTRIC INSTITUTE

STATISTICAL DATA OF THE ELECTRIC LIGHT AND POWER INDUSTRY

Compiled Monthly by the Edison Electric Institute—Covers 100% of the Industry

DURING THE MONTH OF NOVEMBER

	1938	1937	%
	SOURCE OF ENERGY		
Kilowatthours Generated (Net)			
By Fuel Burning Plants	6,497,524,000	5,923,609,000	+ 9.7
By Water Power	3,213,146,000	3,391,049,000	− 5.2
Total Generation	9,710,670,000	9,314,658,000	+ 4.3
Net Purchases			
From Other Sources	355,668,000	320,402,000	+11.0
Net International Imports	113,486,000	94,490,000	+20.1
Total Purchased Power (Net)	469,154,000	414,892,000	+13.1
Total Input	**10,179,824,000**	**9,729,550,000**	+ 4.6
	DISPOSAL OF ENERGY		
Total Sales	**8,475,090,000**	**8,185,272,000**	(a)
Energy Not Reported as Sold			
Used in Electric Railway Department	33,349,000	53,352,000	(a)
Used in Electric and Other Departments	139,221,000	141,330,000	(a)
Furnished Free or Exchanged in Kind	1,720,000	(Not Shown)	(a)
Total Not Reported as Sold	174,290,000	194,682,000	(a)
Total Energy Accounted For	**8,649,380,000**	**8,379,954,000**	+ 3.2
Losses and Energy Unaccounted For	1,530,444,000	1,349,596,000	+13.4
Total Output (To Check Above "Input")	**10,179,824,000**	**9,729,550,000**	+ 4.6

CLASSIFICATION OF KILOWATTHOUR SALES

Based on FPC Classification—November 1938		**Based on EEI Classification—November 1937**	
Residential or Domestic	1,722,644,000	Domestic	1,609,107,000
Rural	(Allocated to Other Classes)	Commercial—Small Light and Power	1,543,065,000
Commercial and Industrial	5,849,203,000	Commercial—Large Light and Power	4,235,966,000
Public Street and Highway Lighting	196,628,000	Municipal Street Lighting	226,094,000
Other Public Authorities	193,527,000	Street and Interurban Railways	375,681,000
Sales to Railroad and Railways	478,719,000	Electric Steam Railroads	103,884,000
Interdepartmental	25,071,000	Municipal and Miscellaneous	91,475,000
Other Sales	9,298,000		
Total Sales	8,475,090,000	Sales to Ultimate Customers	8,185,272,000

CLASSIFICATION OF CUSTOMERS

Based on FPC Classification—November 30, 1938		**Based on EEI Classification—November 30, 1937**	
Residential or Domestic	23,123,742	Domestic	22,465,296
Rural	(Allocated to Other Classes)	Commercial—Small Light and Power	3,878,003
Commercial and Industrial	4,590,264	Commercial—Large Light and Power	567,189
Public Street and Highway Lighting	27,297	Municipal Street Lighting	35,113
Other Public Authorities	75,733	Street and Interurban Railways	317
Railroad and Railways	286	Electric Steam Railroads	26
Interdepartmental	283	Municipal and Miscellaneous	37,942
Others	3,558		
Total Customers	27,821,163	Total Ultimate Customers	26,983,886

REVENUE (b)

Based on FPC Classification—November 1938		**Based on EEI Classification—November 1937**	
Revenue from Sales (Excluding Sales to Other Electric Utilities)	$189,818,200	Revenue from Ultimate Customers	$186,941,000
Other Revenue	2,359,900		
Total Revenue	$192,178,100		

ESTIMATED DOMESTIC ELECTRIC SERVICE RATIOS

(For the 12 Months Ended November 30th)

	1938	1937	%
Kilowatthours per Customer	847	795	+ 6.5
Average Annual Bill	$35.97	$35.18	+ 2.2
Revenue per Kwhr	4.25¢	4.43¢	− 4.1

(a) Data for two years not strictly comparable.
(b) Data not comparable because of an unascertainable amount of "Revenue" in November, 1938, which may or may not have been included in the 1937 data.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 7 FEBRUARY, 1939 No. 2

Economics Through Simplification of Customers' Meters

Three Meters – Three Transformers Cover Range of Low Voltage Installations

Meter and Service Subcommittee, A. B. CRAIG, *Chairman*

THE Meter and Service Subcommittee has just completed two additional projects for standardization in connection with metering work, which are of vital importance to all utility companies. These two projects, namely, Standardization of Low Voltage Current Transformers, and Standardization of Dial Constants, combined with the previous Standardization of Meter Sizes, were unanimously approved by the Electrical Equipment Committee at its meeting on February 7. The committee believes that the complete adoption by every company, of these proposed standards, will prove of substantial benefit, not only to the industry but to the individual company concerned.

Standardization of Meter

The program for meter standardization started a few years ago and which brought about the standard for interchangeable mountings for all makes, and included the detachable mounting, has continued. Another gain has been made in the standardization of meter sizes. The first step was realized when the 5, 15 and 50-ampere sizes were adopted as standard, followed by a price reduction in the 15 and 50-ampere sizes in April, 1937. A further price reduction came about in October, 1938, whereby the 5 and 15-ampere sizes were equalized by reduction in price of the 15-ampere size and a slight increase in the price of the 5-ampere size.

It is estimated that this recent price revision will result in an overall reduction in meter cost of approximately 3 to 4 per cent. Furthermore, with the accuracy characteristics of the 15-ampere and 50-ampere sizes made entirely adequate for the full range of duty up to about 100-ampere, the 15 and 50-ampere meters should rapidly become the predominant standard for self-contained meters. To this end, the cooperation of all the utilities is urged by conforming their meter purchases to these sizes.

Standardization of Dial Constant

A formula, taking into consideration the extended load range of different classes of meters, has been agreed upon for the determination of dial constants.

The manufacturers have agreed to follow this standard, but state that they will experience considerable hardship if it is not universally adopted. Therefore, general acceptance and conformity to this standard by the utilities is needed in order to realize the desired beneficial results. The details of this standard are given in Appendix A.

Standardization of Low Voltage Current Transformer

As a close companion to the standardization of meter sizes, the Subcommittee has now completed its development of an improved low voltage current transformer. The standard sizes finally agreed upon are 200, 400 and 600-ampere. The agreed specifications and dimensions for these transformers are appended. These transformers are accurate over a wide ampere range and are capable of carrying continuously 150 per cent load. These transformers are now commercially available.

The standard meter sizes of 15 and 50-ampere and the improved current transformers of the above sizes provide adequate application to the usual requisite ampere range. The details of this standard are given in Appendix B.

Work Under Way

In addition to the above completed work, the following items are being actively considered by the Subcommittee:

1. *Revision of Handbook for Electrical Metermen*

The revision of the Handbook for Electrical Metermen is steadily progressing and in this work active cooperation is being received from the Pacific Coast Electrical Association. All the material is now in hand and the revision is approximately 70 per cent completed. The Editing Committee expects to complete the work by the spring of 1939.

2. *Meter Bearing Development*

At the recent Committee meeting a subject group was appointed to continue the study of meter bearings. At present there are several types of both pivot and ball bearings. This subject group is now assembling and reviewing all available data on the project, with the aim of eventually standardizing on the best type for all meters.

3. *Summary of Public Utility Commission Rules*

Definite progress has been made in the compilation of rules and regulations of State Public Service Commissions. This report will supersede the N.E.L.A. publication No. 289-40 dated February, 1929. The work is now ready for editing in final form.

4. *Standardization of Current Transformers on Primary Circuit*

The successful development in standardization of low voltage current transformers has brought to attention the

need for similar development of current transformers of primary rating. A subject group has started an investigation of this problem. The purpose will be to obtain a transformer with increased overload capacity and eliminate the multiplicity of sizes which now exist.

5. *Service Cable*

Service cable has been in use for a number of years. A subject group has now been formed to determine and report on first, the accomplishment after several years' experience, and second, the proper specifications for service cables.

6. *Full Sequence Metering*

A subject group has been assigned to study this subject and report on the experience of connecting meters of all sizes ahead of the customers' protective service equipment. This practice has been used for a sufficient length of time to make such a report of value. Particular attention will be paid to damage by lightning to installations having full sequence metering.

7. *Metering of Loads of Short Duration*

A subject group has been appointed to study proper metering for loads of short duration, such as resistance type welders, particularly to consider accuracy on loads of this nature, and to provide valuable information which might assist in designing an equitable rate for this class of service.

8. *Metering of Low Power Factor Loads*

There is an apparent need for consideration of the measurement and control of low power factor, single-phase loads such as Neon signs. A subject group has been appointed to investigate the proper type of metering for this class of equipment.

APPENDIX A

Standard Practice for Dial Constants, Alternating Current, Watthour Meters

Since 1924, self-contained watthour meters have been developed to the point where they are designed to carry with sustained accuracy loads as high as 300 per cent of their rated capacity. This wide load range permits a reduction in the number of necessary sizes of meters, a smaller stock of required meter-repair parts, contributes toward a lower frequency of meter "burn-ups" due to temporary overloads, and thus has a tendency to lower the first cost as well as the operating cost of metering equipment.

If full advantage is to be taken of this overload feature in the newer meters to secure optimum economy, the meters must be applied to operate over the wide load limits for which they are designed. In the case of some sizes of meters (with the old system of dial constants), however, operation under the permissible heavy overloads would cause complete register turnover within a normal billing period unless a register having a dial constant of 10 were used. Registers with dial constants other than 1 are not direct reading, and are objectionable on the large number of self-contained meters which must be read each billing period. Constants other than 1 are always a potential source of error in the transferring of readings and other meter records to the accounting department, and also in billing the customer.

Both the Committee on Metering and Service Methods of the AEIC, and the Meter and Service Subcommittee of the Electrical Equipment Committee, E.E.I. have been active during the past several years in attempts to set up a standard practice for dial constants which would take into account the extended overload capacity of modern meters. Along with this, they have also been active in efforts to influence the meter manufacturer to produce five-dial registers with constants of 1 for use in eliminating those four-dial registers with constant of 10 wherever desired.

The Meter and Service Subcommittee of the Electrical Equipment Committee E.E.I. presents here a finally developed standard practice for dial constants agreed upon by the manufacturers as

Dial Constants for Self-Contained Meters Manufactured Since 1924 and for All Current Transformer Meters

Ampere Rating	*120 Volts*			*240 Volts*			*480 Volts*
	1 El.	*2 El.*	*3 El.*	*1 El.*	*2 El.*	*3 El.*	*2 El.*
			Self-Contained Meters				
5	1	1	1	1	1	1	1
10	1	1	1	1	1	10	10
15	1	1	1	1	10	10	10
25	1	1	10	1	10	10	10
50	1	10	10	10	10	10	10
75	1	10	10	10	10	10	10
			Current Transformer Meters				
100	1	10	10	10	10	10	10
120	10	10	10	10	10	10	10
150	10	10	10	10	10	10	100
160	10	10	10	10	10	10	100
200	10	10	10	10	10	100	100
250	10	10	10	10	10	100	100
300	10	10	10	10	100	100	100
400	10	10	100	10	100	100	100
500	10	10	100	10	100	100	100
600	10	100	100	100	100	100	100
750	10	100	100	100	100	100	100
800	10	100	100	100	100	100	100
1000	10	100	100	100	100	100	100
1200	100	100	100	100	100	100	100
1600	100	100	100	100	100	100	1000
2000	100	100	100	100	100	1000	1000
2400	100	100	100	100	100	1000	1000
5000	100	100	1000	100	1000	1000	1000
10000	100	1000	1000	1000	1000	1000	1000

well as the committee members. The Subcommittee urgently recommends that all purchasers of meters adopt these standards as far as possible, and adhere to them with the prospect that manufacturing costs and hence the price of meters might be reduced eventually as the demands on the manufacturers for a large variety of types and sizes of equipment become less prevalent.

The appended tabulation covers the use of standard four dial registers with dial constants of one, ten, and powers thereof. For the purpose of eliminating dial constants of ten, a standard five dial register may be used which will provide a dial constant of one for those meters listed with a dial constant of ten.

Formula for Computing Expected Maximum Kwhr Registration Within Indexing Period

I = Rated ampere capacity (nameplate marking)
E = Rated voltage (nameplate marking)
N = Number of elements or circuits of meter
L = Extended load range in percent divided by 100
600 = 600 Hours (25 days for 24 hours a day)
1000 = Watts per kilowatt

$$\text{Expected Maximum kwhr for Period} = \frac{I \times E \times N \times L \times 600}{1000}$$

Note: For instrument transformer meters
I = Rated primary ampere capacity of current transformer (nameplate marking)
E = Meter potential coil voltage x potential transformer ratio.

Extended Load Range

The following percentages of load have been used in the determination of constants:

Self-contained Meters, 5 to 25 amps.. 300%
Self-contained Meters, 50 and 75 amps 200%
Current Transformer Meters..... 150%

Dial Constants

Dial constants assigned to meters in accordance with their capacity vary in powers of ten depending upon the expected maximum monthly kwhr consumption. The following kwhr values have been selected to include certain exceptions that would occur if values of 10,000-100,000, etc., were used.

Expected Maximum Kwhr Consumption	*Dial Constant*
1 to 11,000	1
11,001 to 110,000	10
110,001 to 1,100,000	100
1,100,001 to 11,000,000	1000

Dial Constants Other Than Ten or Some Power Thereof

To eliminate the use of registers of different ratios, as is required where the dial constants are ten or some power thereof, a standard register is used. This register would be of a ratio required for the instrument transformer meter when it is considered as a self-contained meter.

The dial constant for such a meter when used with current transformers only, would correspond to the current transformer ratio.

When both current and potential transformers are used the dial constant corresponds to the product of the transformer ratios. The formula that would be used in this case is

$$\text{Dial Constant} = R_c \times R_p$$

Where R_c = Ratio of current transformer (This is obtained by dividing the rated primary ampere capacity by the rated secondary ampere capacity given on the transformer nameplate).

R_p = Ratio of potential transformer (This is obtained by dividing the rated primary voltage by the rated secondary voltage given on the transformer nameplate).

August 2, 1938

APPENDIX B

Current Transformer Development for Metering Purposes

During the past eight years there has been an increasing use of low voltage current transformers for metering purposes. This has been greatly accelerated by the extended use of low tension distribution network systems.

For low voltage metering purposes it has been general practice to use current transformers with a high primary voltage rating and a high secondary voltampere rating. This was due to the fact that the majority of current transformers were required for substation and high tension customer installations. This arrangement had the advantage of using a common stock but there were many disadvantages when used for low voltage metering. The transformers were very limited as to continuous overload (about 25 per cent) which made necessary careful selection of the capacity for a specific installation. There were at least ten capacities, from 100 to 1000 amperes, to select from; capacities above 1000 amperes were special. Due to the limited overload many replacements occurred due to increased customer load and in some instances it was necessary to make customer load checks to avoid transformer burn outs.

The dielectric strength of the transformer insulation was higher than necessary and added to the cost. Recent developments in the coordination of insulation of distribution apparatus has increased the insulation of high voltage transformers. The various designs, makes and capacities did not permit of standardization as to dimensions for the sole benefit of low voltage metering.

It became apparent in 1935 that a current transformer specifically for metering purposes was necessary, if costs were to be reduced and advantages obtained. The Meter & Service Subcommittee reviewed the situation with an idea of crystallizing the various ideas towards setting up tentative requirements as a guide to the manufacturers. The objectives of these requirements were to obtain—

Lower costs.
Increased continuous overload.
Lower secondary voltampere rating.
Higher degree of accuracy.
Standardized dimensions.
Fewer standard sizes.
All of these were accomplished.

As to cost, the manufacturers have indicated that one price would apply to each of their standard sizes; this is approximately $19.45 net.

As to overload, the new transformers have a continuous overload of 50 per cent or greater.

The secondary voltampere rating is 5 voltamperes compared to 50 voltamperes of transformers formerly used.

The resultant watthour meter accuracy is high as the phase angle and ratio errors are small and the limitations set forth in the Chart—see Plate I—insures an accuracy at the watthour meter of ± 0.5 per cent; errors of this magnitude are generally considered negligible. This greatly facilitates the work of calibrating meters where the correction for this

error is omitted because the determination of the correction to be applied to the watthour meter, due to phase angle and ratio errors, is confusing.

Dimensions have been standardized so that one manufacturer's transformer may be used to replace another.

Only three sizes are required to cover a range from 20 amperes to 1200 amperes; whereas ten sizes were generally required heretofore.

Standard LOW VOLTAGE CURRENT TRANSFORMERS

Purpose

The increased use of low voltage networks and increasing capacities of all low voltage metering makes the development of a new coordinated and standardized line of current transformers desirable.

Requirements

Voltage Rating

The transformer shall be rated 600 volts.

Current Rating

The transformer shall be provided in capacities of—

200/5 Amperes
400/5 Amperes
600/5 Amperes

Overload Rating

The transformer shall be capable of carrying 150 per cent of current rating continuously.

Temperature Rise

The temperature rise of the transformer carrying 150 per cent of its nominal current rating continuously shall not exceed 55 deg. C. (Class A insulation)

Burden

The transformer shall be capable of carrying 5 va at 90 per cent power factor within the accuracy limit as specified herein.

Accuracy

The ratio and phase angle errors shall be within the limits shown on Plate 1.

Polarity

The polarity markings are to be in accordance with accepted standards.

Terminals and Dimensions

Plate 2 provides information as to primary terminal dimensions, clearance above the mounting surface and the mounting arrangements.

The two secondary current terminals and the primary potential terminal shall be of the mechanical connector type.

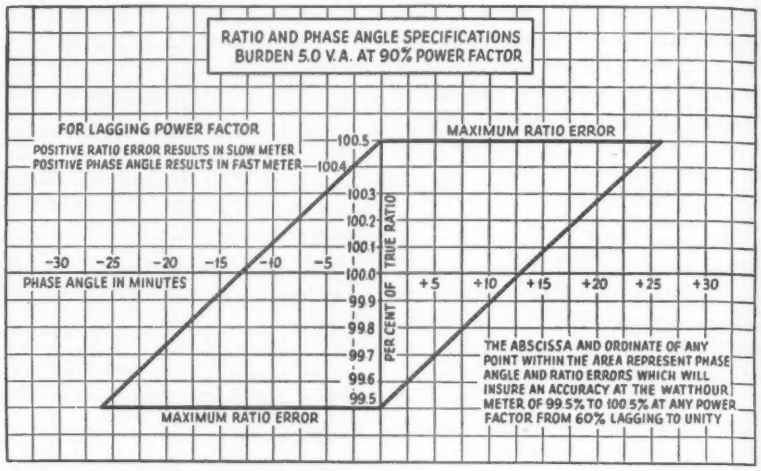

RATIO AND PHASE ANGLE SPECIFICATIONS
BURDEN 5.0 V.A. AT 90% POWER FACTOR
FOR LAGGING POWER FACTOR
POSITIVE RATIO ERROR RESULTS IN SLOW METER
POSITIVE PHASE ANGLE RESULTS IN FAST METER
MAXIMUM RATIO ERROR
PHASE ANGLE IN MINUTES
-30 -25 -20 -15 -10 -5
+5 +10 +15 +20 +25 +30
PER CENT OF TRUE RATIO
100.5 100.4 100.3 100.2 100.1 100.0 99.9 99.8 99.7 99.6 99.5
MAXIMUM RATIO ERROR
THE ABSCISSA AND ORDINATE OF ANY POINT WITHIN THE AREA REPRESENT PHASE ANGLE AND RATIO ERRORS WHICH WILL INSURE AN ACCURACY AT THE WATTHOUR METER OF 99.5% TO 100.5% AT ANY POWER FACTOR FROM 60% LAGGING TO UNITY

PLATE 1

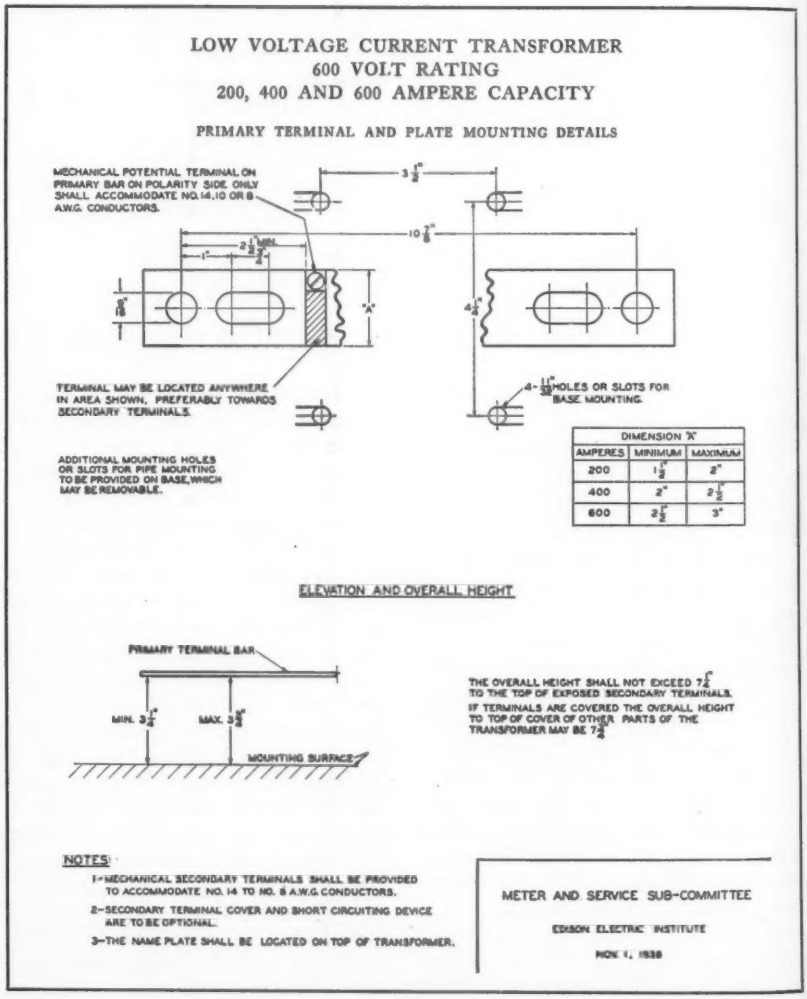

LOW VOLTAGE CURRENT TRANSFORMER
600 VOLT RATING
200, 400 AND 600 AMPERE CAPACITY
PRIMARY TERMINAL AND PLATE MOUNTING DETAILS
MECHANICAL POTENTIAL TERMINAL ON PRIMARY BAR ON POLARITY SIDE ONLY SHALL ACCOMMODATE NO. 14, 10 OR 8 A.W.G. CONDUCTORS.
TERMINAL MAY BE LOCATED ANYWHERE IN AREA SHOWN, PREFERABLY TOWARDS SECONDARY TERMINALS.
ADDITIONAL MOUNTING HOLES OR SLOTS FOR PIPE MOUNTING TO BE PROVIDED ON BASE, WHICH MAY BE REMOVABLE.
4-HOLES OR SLOTS FOR BASE MOUNTING.
DIMENSION "X"
AMPERES | MINIMUM | MAXIMUM
200 | 1 1/2" | 2"
400 | 2" | 2 1/2"
600 | 2 1/2" | 3"
ELEVATION AND OVERALL HEIGHT
PRIMARY TERMINAL BAR
MIN. 3 1/4"
MAX. 3 3/4"
MOUNTING SURFACE
THE OVERALL HEIGHT SHALL NOT EXCEED 7 1/2" TO THE TOP OF EXPOSED SECONDARY TERMINALS.
IF TERMINALS ARE COVERED THE OVERALL HEIGHT TO TOP OF COVER OF OTHER PARTS OF THE TRANSFORMER MAY BE 7 3/4"
NOTES:
1-MECHANICAL SECONDARY TERMINALS SHALL BE PROVIDED TO ACCOMMODATE NO. 14 TO NO. 8 A.W.G. CONDUCTORS.
2-SECONDARY TERMINAL COVER AND SHORT CIRCUITING DEVICE ARE TO BE OPTIONAL.
3-THE NAME PLATE SHALL BE LOCATED ON TOP OF TRANSFORMER.
METER AND SERVICE SUB-COMMITTEE
EDISON ELECTRIC INSTITUTE
NOV. 1, 1938

PLATE 2

Issued January 19, 1937.
Revised November 1, 1938.

The Meter Plan for Electric Refrigerators

An Estimate of Its Use in Selling

By B. A. Seiple
Jersey Central Power and Light Co.

ONE of the pertinent subjects under consideration by the Refrigeration Committee of E.E.I. has concerned sales methods designed to sell the present unsold customers. A cross section of methods used indicated a growing preference to what is termed "The Meter Plan." A sub-committee, of which the author is chairman, has undertaken to review the Meter Plan as used by numerous companies and to detail the strength and weaknesses of this plan of selling from direct field experience.

It was generally conceded that this method of selling would meet with favor as a means of reaching low income customers. This group particularly has established buying habits on a daily basis, being accustomed to buying most household necessities in this manner. The Meter Plan, then, calling for a small daily payment is a method they like and with which they are familiar. That the use of it has been a help to customer relations is a viewpoint of some companies since it completely divorces the appliance payments from the monthly service bill. In so doing, it keeps apart in the customer's mind the cost of the appliance and the operating cost.

Some companies have used the Plan as a means of improving Dealer relations. When cooperative plans are conducted, the usual procedure is for the Utility Company to carry Dealer paper upon approval of customer credit.

Several companies adopted the Meter Plan only as a method of combating poor business years and have given up the plan as business improved. It did, however, in the opinion of all of these companies, increase their refrigeration sales over previous years during the period it was used. All companies queried agreed that the Meter Plan to be successful must be set up as a sound selling program and not one to reach out for questionable credit risks. Credit should be established for selling it on exactly the same basis as any other term contract. When so established, it has been found to provide a sound collection method and when terms comparable on a monthly basis are offered along with the Meter Plan, there was expressed preference for it.

Some companies have felt that this program can be highly successful when used in one campaign, but loses its value in a repeat activity. Others have used it for four years and report continued success.

April and May were preferred as special campaign months by many companies using the Meter Plan for more than one year. Reasons given were that refrigeration was considered necessary every day from April through October by customers and payments would be made regularly insuring a reasonable equity in the refrigerator before the winter months. In this connection, all considered it most important to insist upon the full amount due being deposited in the meter each month and for the collector to demand any shortage which might exist owing to not using the refrigerator. Too much stress cannot be given to this particular collection consideration, since through this sort of collection device, if a customer fails to pay in one month, it is fair to assume that it becomes doubly difficult to collect a two months' account. It was pointed out that the contract signed by the customer should stipulate the daily payments and also a phrase similar to "NOT LESS THAN $——— PER MONTH."

Given as one of the outstanding reasons for lack of success with the Meter Plan was an attempt to sell the customer on this method, and then, within a short time, attempt to remove the meter and change the customer to regular monthly payments.

There exists a diversity of opinion as to the limiting of the size of refrigerator sold on the Meter Plan. This is apparently a question which local conditions control since successful operations have been consistently run on both plans.

The cost of the meter is included in the finance charge by most companies questioned. This likewise is a matter for local policy to decide.

Collections

Many companies have looked with favor upon the Meter Plan from a sales viewpoint, but have abandoned the idea through concern over the collection consideration. It is true that the Meter Plan in itself is not a panacea for collections on refrigeration business, but properly schooled, collectors have shown a better collection ratio on such accounts than on regular term contract business. The establishment of credit approval when using the Meter Plan has been built around the customer earning power and the known ability to keep employed, the meter itself providing the daily persuasive collection argument.

Quoting direct from a statement of the Collection Department of one large utility:

"Our experience with refrigerators sold under this plan has been very satisfactory. Our records indicate that these boxes go into low income homes among a class of very thrifty people. In many cases the customers prepay in an attempt to pay out the balance as quickly as possible. A large number of customers who buy under this class of sale later request that their account be transferred to our regular deferred payment billing. In very few cases has it been necessary to repossess the merchandise. The same method of approving credit on this class of sale is used as is practised for any other type of equipment sold. In some instances, we have transferred straight deferred contracts to 'meter-ice' and in this way assisted the customer to retain the box in his home."

Companies considering the Meter Plan of selling in cooperation with Dealers might write to the Central Hudson Gas & Electric Corporation, Poughkeepsie, New York, for their booklet on "Plan for Financing Installment Sales." Companies considering the Plan for their own sales organizations only, or desiring further information are urged to write for full information, addressing J. F. Porter, Jr., Electric Refrigeration Committee at Edison Electric Institute.

Other members of the Committee are O. M. Jackson, Atlanta Ga.; G. B. Richardson, Dallas, Texas; R. C. Geppert, Omaha, Neb.; D. K. Wright, Newark, N. J.; J. E. Averett, Savannah, Ga., and B. A. Seiple, Asbury Park, N. J.

SIXTH ANNUAL SALES CONFERENCE, E.E.I.

H. E. DEXTER, *Chairman*

Edgewater Beach Hotel, Chicago, Ill., March 21-24, 1939

SUBJECT PROGRAM

Tuesday Morning Session (General)

FORWARD PROGRESS IN COMMERCIALISM
UTILITY SALES DEPARTMENT RESPONSIBILITY FOR INVESTMENT EFFICIENCY
ORGANIZED TRAINING IN BUSINESS
SOME PROBLEMS AND OPPORTUNITIES IN THE RURAL MARKET

Afternoon Session (Better Light-Better Sight)

DAWN OF A NEW DAY
LIGHT FLASHES—ACROSS COUNTRY
LIGHT AND DECORATION
GOOD LIGHT—GOOD PUPILS
FLUORESCENT LIGHTING—HAS IT ARRIVED?

Wednesday Morning Session (General)

DO ELECTRIC APPLIANCES MEET WOMEN'S EXPECTATIONS?
STEPPING UP DEALER SALES
SELLING THE HOME MARKET OF TOMORROW
THE NEW DOMESTIC MARKET—A MANUFACTURER RESPONSIBILITY

Wednesday Noon (Formal Luncheon)

Wednesday Afternoon (Modern Kitchen Session)

LOAD BUILDING WITH KITCHEN EQUIPMENT
THE RANGE CAMPAIGN OF 1939
ROASTERS THE BIG NEWS
LOCAL KITCHEN PROGRAMS THAT WERE PROFITABLE
WE CAN BE OPTIMISTIC

Thursday Morning Session (General)

FITTING ADVERTISING INTO THE MERCHANDISING PLAN
THE HUMAN APPEAL IN ADVERTISING
THE PUBLIC HEALTH ASPECTS OF AIR CONDITIONING

Afternoon Session (General)

MEETING WIRING OBSTACLES IN MODERNIZING COMMERCIAL AND INDUSTRIAL BUILDINGS
THE COMMERCIAL MARKET IS UNDERSOLD
THE ELECTRIC DOLLAR IS ON THE PLATINUM STANDARD
WHAT'S NEW IN DIESEL COMPETITION

Friday (All-day)

(Closed sessions on Power Sales)

Morning Session

INDUSTRIAL SALES 1939 MODEL
Some Problems of Industrial Sales
Meeting Industrial Problems in Compact Area
Meeting Industrial Problems in Intermediate Area
Meeting Industrial Problems in Scattered Area

Afternoon Session

INFRA-RED HEATING
OAK TREES FROM LITTLE ACORNS GROW
CUSTOMER BENEFITS
(Sound Slide Presentation from National Customer Benefits Contest)

Conference days will be preceded by meetings of all Commercial Committees, March 20th. Chairman H. E. Dexter has called a dinner meeting of the General Sales Committee for the same evening, at which Committee reports will be presented and other important business discussed. On Wednesday evening an informal dinner is planned for Advertising Executives.

Prize Winners in the Customer Benefits Contest

ANSON D. MARSTON of the Kansas City Power and Light Company, Kansas City, Missouri, was announced on January 31 as the winner of the first prize, $100.00, in the Industrial and Commercial Customer Benefits Contest. Alex E. Hunter, Philadelphia Company, Pittsburgh, Pa., was awarded second prize, and Douglas C. Hornig, Pennsylvania Power and Light Company, Allentown, Pa., won third prize. These three prize winning papers appear in this issue of the BULLETIN.

Judges in the contest were:

C. A. Eastman, Ebasco Services, Inc., New York, N. Y.
J. F. Gaskill, Philadelphia Electric Co., Philadelphia, Pa.
A. D. McLay, Detroit Edison Co., Detroit, Mich.
W. H. Sammis, Commonwealth & Southern Corp., New York, N. Y.
H. C. Thuerk, Utility Management Corp., New York, N. Y.

The first three prizes will be presented to the winners at the National Sales Conference of the Edison Electric Institute, to be held at Chicago, Ill., March 20-24, 1939.

Ten other cash prizes were awarded as follows:

Jay W. Andersen, Central Power Co., Grand Island, Neb.
W. M. Barnwell, Carolina Power and Light Co., Darlington, S. C.
Ned W. Beaudreau, Central Power and Light Co., Corpus Christi, Texas.
James H. Campbell, Consumers Power Co., Lansing, Mich.
J. E. Errickson, Public Service Electric and Gas Co., Camden, N. J.
John Howell, Jr., Buffalo Niagara Electric Corp., Buffalo, N. Y.
Enrique Novellas, Cia. Cubana de Electricidad, Santiago de Cuba.
Paul S. Patterson, West Penn Power Co., Pittsburgh, Pa.
W. E. Peugh, Dallas Power and Light Co., Dallas, Texas.
E. W. Thomas, Public Service Co. of New Hampshire, Manchester, N. H.

One hundred and eighty-six contestants representing all parts of the United States, and Cuba, submitted papers based on the general theme of Industrial and Customer Benefits through the use of purchased power. The contest was open to all employees of electric

(*Continued on page 75*)

Customer Benefits Prize Paper

Why I Get My Power Service from a Power Company

By Anson D. Marston
Kansas City Power and Light Co., Kansas City, Mo.

James B. White
President

MID-CENTRAL
MANUFACTURING COMPANY
Liberty and Oak Streets
CENTER TOWN, U. S. A.
November 25, 1938

Mr. Wm. H. Youngman, Pres.
Western Manufacturing Company, Inc.
18th & Wilson Streets
St. Louis, Missouri

Subject: WHY I GET MY POWER SERVICE FROM A POWER COMPANY

Dear Bill:

So you're planning to put in a power plant of your own, and cut loose from the power company? I appreciate your writing first to ask my reasons for staying with the power company. Your Father was like that, and I'm glad to see you have the same determination to be sure before you act.

Most of the private plants I've seen were bought because someone "took a notion." If you've already made up your mind, don't bother to read this. If you still have an open mind, my own reasons may be of interest to you.

Although I've never stopped before to analyze them, it seems to me the most important reason for buying power from a power company is the question of FLEXIBILITY. Today the business picture changes with startling rapidity and, like a boxer, the successful business man must be quick on his feet to meet new problems and new conditions. Like a ball chained to his ankle, a private power plant will tie him to his present power conditions, making it more difficult to make sudden changes in quantity or type of electricity used.

About 25 years ago Jack Wilson put in a fine power plant generating direct current for his machinery plant. He was an aggressive merchandiser, and his business grew, so soon he had to invest much-needed capital in more power plant. New machines were developed, but they used alternating current. Jack couldn't afford a new power plant, so he struggled along with the old machines for years. Came the depression, and the same old power plant was there, eating up his money. Today Jack is happy—he junked the old plant and lets the power company do his worrying.

MR. MARSTON

Maybe the electricity we use in 1958 will be the same kind we use today; maybe not. I, for one, am not willing to gamble my money against the chance of some radical new development. Are you?

You remember "Red" Greene, who makes automobile accessories? Last week I was in his plant. He had just received a rush order for three carloads of auto heaters. It meant night work for one department, and he had to order a full power-house force down too—at time and a half for overtime. All I have to do in such a case is to throw a few switches.

"Red's" business is growing, and he needs more space for a new department. With taxes on undivided surplus the way they are, he is hard-pressed for capital, and can't afford to build a new factory. I think he may put the new department where his power plant is today—and save also the expense of that new Diesel he needs for his increasing power requirements.

Another reason why I buy power service from a power company is QUALITY SERVICE. I like to ride in a Cadillac. You like a Buick. That new foreman of mine drives a Ford. I paid more for my Cadillac than he did for his Ford, but I felt it was worth more.

I used to think all kilowatt hours were alike, but my boy "Jim," who took engineering at school, pointed out lots of differences to me. Some are short and wide, spread evenly over a long period of time. Some are tall and thin and expensive, and come all at once. Some are well-polished and solidly made, with even voltage and steady frequency. Some are rough and poorly made. It pays to buy the best.

For example, I noticed at "Red's" that whenever one of his big stamping mills started the lights jumped. I watched one of his clerks sorting orders, and he made a couple of bad mistakes just when the lights were dancing their merriest. Wonder what the customers would have said if the chief clerk hadn't just happened to catch those errors. If my lights were to jump like that I'd sure get a man out from the power company in a rush!

Another thing I noticed was the difficulty his men had doing high-speed grinding when the frequency (and the grinder speed) varied so. His rejects from this department are twice what they should be—and rejects cost money.

The clock in "Red's" office was 15 minutes slow. I asked why he didn't get an electric clock, which would stay right. I should have known he couldn't use an electric clock on a private plant.

How much are these things worth?

How much is it worth to you to ride in a Buick instead of a Ford?

Bill, you really started something when you asked me this question! I'm thinking of so many reasons I could write quite a book on the subject.

One of the considerations important to me is CONTINUOUS, DEPENDABLE SERVICE. My pay-roll is about $175 an hour. Allowing for interrupted routine, spoilage of work in progress, delayed deliveries, etc., an interruption in power service costs me at least $600 an hour.

The power company has three power plants, so that if one gets shut down the others can carry the load. Their power lines are arranged so that, if the one serving me is blown down, another line is switched in automatically. Of course all this costs money, but it is worth it to me. Another thing about its service that assures me of continuous operation is the large force of trained service men ready to pitch in and fix any trouble.

Last summer, for the first time in the ten years I've been using their power, my service went off completely. A terrific windstorm had blown down both power lines. I was downtown at the club when the word reached me, and as I drove out to the plant I counted ten gangs of men working to put the lines back up. Really I can't kick over thirty minutes in ten years.

About the same time one of "Red" Greene's Diesels went on the blink—I think he said it was a blown cylinder head. His men couldn't fix it, and it was two hours before the service men even got to his plant. They had to send to Chicago for a new part, and it was six days before the thing was fixed—right in his busy season, too.

I guess all machinery is much alike. You can make it ever so good, but some day something goes wrong, and there you sit "like a bump on a log," till it is fixed.

Better figure out how much it would cost you to be shut down an hour, Bill. See how many hours it would take to eat up all possible savings by your private plant.

Another thing I often think of is FREE SERVICE BY THE POWER COMPANY. Sounds funny, doesn't it? But let's see.

I'm in the business of running a factory. I don't have time to keep up with all the latest developments in the use of electricity—and there are lots of them. I've seen *very* few plant superintendents who did. But the power company has men whose business it is to do this—and whom I can call upon any time.

The one I see most is named Henry Meier—"Heinie" I call him. Whenever I want anything from the power company I call him, and he sees that I get service. Better get thoroughly acquainted with the man from your power company, Bill, and make use of his knowledge. You know a big company is just a lot of individual employees. Get to know your power company as "Jack," or "Joe," or "Carl." If will pay you dividends.

Last week "Heinie" told me about a new type of control that has just been developed for one of my machines. It is going to save me about $500 a year. Last summer we were having trouble matching colors in one department during the night shift. He got an illuminating engineer to come out and design a special lighting fixture to meet our needs. Rejects dropped 67 per cent, and I figure the saving at $700 a year—to say nothing of the better product we have now. This illumination engineer suggested new lights for my sorting department, and speed jumped 25 per cent almost overnight—with fewer mistakes.

We used to have trouble heat-treating some parts of one of our machines. Seemed as if about a third of the pieces would fail, no matter how careful we were. "Heinie" got a friend of his in the company, who specializes in electric heating, to come out and study our trouble. He suggested a special type of electric oven, and today our rejects are down to about 3 per cent. I haven't stopped yet to figure how much we save, but it is quite a bit.

Last week we had trouble with the power line to one of our departments. Fred, our maintenance man, just couldn't get it to work right, and work was piling up for that department. I put in a rush call for "Heinie," and he got a trouble man out here "toot-sweet." He found the trouble in five minutes, and helped us locate the special kind of switch we needed at one of the stores here in town. I don't know of any other place where we could have got hold of a man trained in such things.

Last winter we were planning a new heating plant. We needed also a small amount of high pressure steam for process use. "Heinie" got one of the power company's trained engineers to help us with the design, and the new plant works splendidly.

About the same time we wanted to run some special tests in one department, and needed some expensive instruments for a few days. "Heinie" arranged for the power company laboratory to lend them to us. They had the only ones within 300 miles.

Another thing, Bill, that I can't put a dollar value on is the matter of community service. You know I was General of a Division in our Community Chest drive last year. I was impressed by the number of power company men who gave time and money to help out. They help in many other ways, too. No, that doesn't buy me any potatoes, but it does help make my city a better place in which to live.

Somehow, whenever I talk to an engine salesman, I can't help thinking of these free services. Taken all together, they help me quite a bit, and when I sign the check for the power bill I like to think I'm getting a lot more than just plain electricity.

Did you ever stop to consider just *why* the private plants you know about were installed? I did, a while ago, and I was surprised how many were installed because some ambitious subordinate saw a chance to increase his own importance and, eventually, his salary. Many and many a time some engineer or superintendent feels, consciously or unconsciously, that a private power plant would increase his own opportunities, so he starts the ball rolling. I've seen several cases where plants costing $50,000 to $100,000 were turned over to $125-a-month engineers—men who were no more qualified for such responsibility than my janitor is, although they were fine men within their limitations. Probably this doesn't apply to you, but I know several men who should have stopped to analyze just who was pushing them into the purchase of a plant—and why.

You will notice, Bill, that I've saved till the last the question of LOWEST TOTAL COST. Of course cost is important, but I try to keep things in their proper perspective. In my business power costs represent 1.2 per cent of my gross business (what percentage are they of yours?). That money is important, but not nearly as important as it is for me to be alert to every development in the business proper. (I wonder how much extra you could earn if you spent on your business the amount of your time a power plant will occupy?)

Pounds are more valuable than pen-

nies, and I make my money in the manufacturing business.

With this qualification, let's see how this question of cost stacks up. I'm buying a Cadillac, and I would be making a Ford, but even then I wonder if I could make the Ford as cheaply.

I know just exactly what my power costs me, because I have only one check to sign each month. If I put in my own power plant there would be "forty-eleven," and I wonder if you have taken all of them into consideration.

Let's see what they would be. First, there would be one for fuel. Then would come one for lubricating oil, a dozen or so for labor, and a myriad of small ones for extra stationery and postage, waste and miscellaneous supplies, extra water, extra telephone service, and so on "ad nauseam." Then, too, there would be several large ones many people forget—one for the gradual wearing out of the plant, another for the interest on my investment (you're a good enough business man to realize the importance of that, Bill), another for extra taxes and extra insurance, another for the cost of the extra space, and some others I've forgotten (don't you forget them, Bill, or you'll regret it).

Now here's the point I'm trying to make. Every single comparison I've ever seen of costs has left out a lot of these other checks that need signing—when Mr. Private Plant gives you his estimate these other checks stick out of his hip pockets and shirt pockets and coat sleeves, but they don't get into very many of his lists of comparative costs. Are they in yours?

Don't you make the mistake of taking only the "out of pocket" expenses into consideration when you make your comparison, Bill. That sort of fuzzy thinking has wrecked more businesses than you can count. Old Man Depreciation, with his partner, Interest on Invested Capital, is a part of the picture whether you see him or not. Many an otherwise smart business man has listened to specious arguments to the contrary, only to suffer later on for his folly.

Remember, too, that many cost items have a tendency to grow amazingly, once a plant is put in. A club here in town (maybe you can guess which one) put in its own plant a few years ago. One of the moot points was the question of labor costs. The club had one engineer at the time, and was solemnly assured that no additional labor would be required. A few weeks ago, some of its employees struck, and the club was left in darkness. *Ten* engineers were among the strikers. I do admire that figure ten!

A few years ago a friend of mine wanted to put a Diesel engine in his cleaning plant. No, he didn't need two engines—one would be enough. No, he didn't need many controls—those were included in the price of the engine. I think the plant was to cost him $5,000. About a year later I saw him. He had bought the engine, but found he needed another to use when his one engine was shut down. After he bought his second engine he found it couldn't operate at the same time as the first—"wouldn't parallel with it," whatever that means. So he was planning to buy still a third engine. Also he had spent about $500 for instruments of various types. Altogether, his "$5,000 plant" cost him a bit over $9,000. Unusual experience? Bill, the power plants that went in without extra and unforeseen expenses are as scarce as Israelites in the Reichstag. Unless your estimates have been carefully prepared by competent and unbiased engineers, I'll bet you a World Series ticket against one to a Church Sociable that the finished plant costs at least 20 per cent more than you expect. You be the judge.

A minute ago I mentioned that lots of operating costs don't get into comparative estimates. That point deserves repetition, Bill, because usually it is little things that wreck big businesses. That workmen's compensation for the fireman who sprained his ankle—that long distance call about the broken crankshaft—that rubber floor mat for the engine room. Did they get charged against the power plant? How about the Social Security tax on the engineers' salaries? I've seen the accounts of quite a few business concerns in my time, and not one in fifty goes to such refinement. Yet those hidden items take enough money to buy many a steak dinner—trimmings included.

Another thing. Thirty-odd years ago I put in my own plant, and I used it for twenty years. Then I woke up to the fact that I could buy power for almost exactly half what it cost at first. All those twenty years my power costs had gone on at just about the same level. How would your comparative figures look if the power company cut its rates? How will they look in 1953, or 1958.

Long before I woke up and junked my power plant, old man progress had caught up with me and passed me by. Yes, the old engines ran well, but not nearly as well as the latest streamlined, double-jointed engines. Will your new ones still be modern in 1958? I doubt it. If some new Edison or Steinmetz comes along in the meantime, I won't have to worry, becauses the power company takes care of that for me.

A few weeks ago a new wage-hour law went into effect. It says everybody must pay time-and-a-half for more than 44 hours a week. I know several private plants where this will play "hob" with costs. Labor unions are agitating today for a thirty-hour week. Suppose they got a law passed with such a provision—what would it do to your savings?

By-the-way, Bill—are your comparative costs based on business as it was in 1929? In 1933? As it is in 1938? As it will be in 1948? I know several beautiful sets of figures that got knocked into a cocked hat by old man depression—are yours like that? Maybe you are smart enough to say what business will be like in five years—and ten years—and later. If so, I wish you would tell me what it will be like next year! One of the reasons why I get my power service from a power company is because it is less of a gamble with old man business cycle. Buying a private plant means betting that many thousand dollars that business will behave "just so."

There are a lot of other things I could mention, Bill—such as the danger of higher taxes, the danger of accidents, the extra cost of keeping power plant accounts, etc. But "Time marches on," so I'll quit now.

I think that the fundamental reason why I get my power service from a power company is the fact that my own business takes all of my time and needs more still. I'd rather let somebody else handle the worries of this other business!

Your old friend,
/s/ Jim
James B. White, President.

A Note on the Preceding Article

By the terms of the Industrial and Commercial Customer Benefits Contest, contestants were privileged to present their written entries in any manner preferred, i.e., tabular form, essay, sales argument, etc. The writer of this paper therefore has presented his Customer Benefits in the form of a letter to the head of a hypothetical company.

Customer Benefits Prize Paper

How Purchased Power Solves Users Problems

By Alex E. Hunter
Philadelphia Company, Pittsburgh, Penna.

AUTHOR'S NOTE: The following sections give an outline of the principal *benefits* enjoyed by commercial and industrial users of Purchased Central Station Electric Service. Because many of the benefits are common to both commercial and industrial users, no division was made on the basis of these two classifications. However, in order to increase the usefulness of this compilation, these benefits have been listed under five separate headings:

Purchased Power Helps Solve Production Problems

Purchased Power Helps Solve Distribution Problems

Purchased Power Helps Solve Financial Problems

Purchased Power Helps Solve Accounting Problems

Purchased Power Helps Solve Personnel Problems

An attempt was made to state each *benefit* in terms that a user or prospective user can easily grasp and these statements were expanded to show why Central Station Electric Service offers the benefits enumerated.

Purchased Power Helps Solve Production Problems

1. Purchased power cuts production costs.

(a) It reduces to a minimum the cost of power, light and heat because large, modern, electric central stations employ efficient mass-production methods and can in the vast majority of cases, sell power for less than the private plant can make it. Moreover, the cost of central station electric service has been decreasing year after year but the cost of operating a private plant has been increasing and probably will continue to do so.

(b) It eliminates labor, maintenance, repair, fuel, lubrication, water, space, depreciation and insurance costs incurred in the operation of a private plant. These items are totaled by the utility and therefore appear as part of a single monthly charge for electric service; but because of the diversity between the electric requirements of the many customers, these charges become proportionately small for each.

MR. HUNTER

(c) It leaves the customer's money available for more advantageous purchases of materials, for discounting bills, for advertising, selling and expansion. Electric central stations provide the facilities for supplying power thereby allowing customers to employ their own funds more profitably.

(d) It increases productivity of workers and thus decreases the cost of labor chargeable to each unit of product. Constantly available electric power with closely controlled voltage and frequency is a worker's most productive tool. Motors operate at their rated speed, heating operations and time control devices are more satisfactory and lighting is better. The central station industry has spent billions of dollars to provide this continuous high grade service for its customers.

(e) It reduces the cost of night operation; also the cost of operating a single department when the rest of the plant is shut down. Central station service makes it unnecessary to incur the extra expense of keeping a power plant working when only a small amount of power is needed or when it is desirable to keep the store or factory open a few hours overtime for cleaning, taking inventories, getting out a rush order, working on the books, making alterations or for serving customers who cannot come during the daytime. Central station service is always available.

(f) It eliminates the expense of maintaining a fuel supply. Customers need not tie up their money in fuel storage in anticipation of strikes or other unfavorable conditions because the central station industry has provided these large fuel surpluses as one of the guarantees of continuous service.

(g) It reduces cleaning and painting costs because purchased electric service is spotlessly clean. It produces no smoke, dirt or ashes.

(h) It reduces overtime wages paid for weekend inspection and maintenance work. The central station industry operates and maintains the power generating equipment and assumes the responsibility and cost of keeping this equipment in first class condition.

2. Purchased power speeds production.

(a) It helps maintain operating schedules by providing a constant supply of energy to meet the customer's instant needs.

(b) It drives motors at their full rated speed; also it makes possible the use of accurate time control. Purchased service provides power with voltage and frequency accurately controlled between very narrow limits.

(c) It releases valuable space for manufacturing operations because purchased power requires little space.

(d) It makes possible advantageous night operation. Purchased power is always available both night and day. It eliminates the necessity of maintaining an extra crew or paying overtime wages to engineers and firemen to run an isolated plant at night.

(e) It makes possible better lighting and better seeing conditions which in turn increase the output and accuracy of workers. Central stations not only provide good voltage and current free from noticeable oscillations, but offer without cost the services of lighting experts who make recommendations for improving office, factory and store lighting.

(f) It takes care of sudden increases in power demand and makes plant expansion easier. A telephone call to the electric utility will start the work of supplying additional capacity to meet the increased power requirements. Customers need not worry about the large expense and delay that would be necessitated by the installation of additional power generating capacity.

(g) It leaves customer's funds intact for the purchase of modern and efficient machinery. Users of purchased service need not tie up large sums of money in expensive generating equipment but, instead, may use their money to buy machinery that will increase production.

(h) It permits managers of concerns which buy central station electric service to devote a greater share of their time and energy toward the study of production problems with a view to increasing output and reducing costs.

(i) It reduces annoyance, fatigue and resultant inefficiency which accompany noise because purchased central station service does its work silently.

3. Purchased power reduces losses.

(a) It reduces losses resulting from power outages. It reduces spoilage of perishables caused by shut downs of refrigeration plants; it decreases losses through freezing of electric furnace charges; it eliminates losses which would result from the inability to sell merchandise which had absorbed oil and exhaust gas odors.

(b) It decreases losses caused by fire, air tank explosions, fly wheel ruptures and damages resulting from improper functioning of auxiliary equipment. Reasonable precaution assures absolute safety in the use of purchased electric service.

(c) It decreases loss resulting from delays in operating schedules. Enforced shut downs often mean failure to meet promised delivery dates which in turn cause loss of business. Power outages disrupt work schedules and increase unit labor costs. Continuous purchased power is an effective guard against such losses.

(d) It reduces losses caused by lighting outages. Failure of store lighting increases pilfering and causes loss of sales. Failure of office lighting reduces output of salaried workers.

(e) It reduces rejects. Work spoiled by inaccurate functioning of temperature and time control devices, by presence of oil in process steam and by lowered speed of machinery, not only causes loss of customer's good will but also necessitates expense of returning merchandise for additional fabrication. Purchased power reduces such losses.

(f) It reduces lamp burn-outs. The life of a lamp is greatly shortened by increased voltage. Purchased power has voltage controlled between narrow limits.

(g) It decreases loss resulting from divided attention of management. Purchasers of central station electric service are relieved of power plant worries and therefore can concentrate on reducing losses.

4. Purchased power improves shop methods and permits increased economies.

(a) It makes available to customers the free services of experts on power utilization.

(b) It gives to management more free time to consider better ways of doing things.

(c) It permits use of methods employing automatic controls. Many control devices use electric clocks whose accuracy depends upon close frequency regulation—a characteristic of purchased service.

(d) It permits customers to buy modern machinery with money that they did not have to spend for expensive generating equipment.

5. Purchased power makes expansion easier. It places customers in a more advantageous position to compete for a larger share of business.

(a) It leaves funds intact for buying machinery, extending buildings and increasing production facilities.

(b) It makes available a larger percentage of space in existing buildings because of absence of power generating equipment.

(c) It reduces time and effort required to increase the power supply because this problem can be turned over to the utility company.

6. Purchased power improves the quality of products because it permits the use of improved production methods.

(a) See 4 a, b, c and d.

7. Purchased power reduces labor charges.

(a) It reduces or eliminates power house attendance costs.

(b) It reduces maintenance work, cleaning and painting because it does away with engines and generators and thereby reduces smoke, fly ash, grease, oil spoilage and ashes.

(c) It reduces supervision, also bookkeeping expenses. Central station customers are relieved of the work of figuring power costs.

8. Purchased power reduces managerial worries and permits additional thought to be given to improvements capable of producing greater returns.

(a) It reduces worries about power outages, rejects, spoiled material, overhead expenses, fire and explosion hazards and labor troubles.

9. Purchased power reduces accidents.

(a) It reduces the amount of hazardous equipment on the premises thus eliminating many of the causes of accidents.

10. Purchased power makes it easier to plan and budget operations.

(a) It makes the estimating of power costs easier because they are based upon established rates unaffected by fluctuations in general prices.

11. Purchased power solves the problem of supplying temporary loads.

(a) It reduces the time and expense involved in supplying electric current for fairs, exhibits, night athletic games and other temporary requirements.

12. Purchased power simplifies building design.

(a) It makes unnecessary the erection of stacks or chimneys, the excavation for oil storage tanks or the construction of engine foundations.

(b) It eliminates the expense of separate enclosures to house generating equipment.

(c) It makes available for productive uses the space otherwise used for cooling towers or spray ponds.

(d) It permits less expensive building construction by eliminating the necessity for supporting cooling towers and/or traveling cranes.

13. Purchased power permits greater leeway in the selection of factory sites.

(a) It permits the location of factory buildings without regard to water or fuel supply.

(b) It reduces the area of ground required for a plant because the problem of power plant room and fuel storage space need not be considered.

Purchased Power Helps Solve Distribution Problems

1. Purchased power promotes increased sales and reduces selling costs.

(a) It decreases production costs which is reflected in reduced selling prices.

(b) It makes available to central station electric customers surplus funds which they may use to carry on more intensive selling and promotional activities.

(c) It permits the more advantageous use of night sign lighting because inexpensive central station power is available at night.

(d) It improves the quality and desirability of products as mentioned under the heading of production.

(e) It makes available the free services of experts in display lighting.

(f) It makes keeping the store open in the evening more profitable because of the small extra cost of night lighting.

(g) It helps customers meet promised delivery dates as suggested previously.

(h) It reduces sales resistance because of concern's reputation for high quality products and service.

(i) It improves morale of salesmen.

(j) It gives, in general, customers advantage over competitors who make their own power.

2. Purchased power reduces service costs.

(a) It reduces rejects and complaints because it improves quality of products.

(b) It reduces the expense of returning and refabricating unsatisfactory merchandise.

(c) It reduces time and expense of salesmen incurred in making adjustments.

(d) It permits the management to devote more time to the study and development of superior selling technique with the result that customers' needs will be more correctly satisfied and their complaints lessened.

3. Purchased power helps improve public relations.

(a) It reduces the smoke and dirt nuisance.

(b) It helps keep the factory clean and improves its appearance.

(c) It allows more money to be spent on beautifying the property and carrying on good will advertising.

(d) It reduces or eliminates noise, thereby overcoming a serious objection.

(e) It reduces the nuisance of coal, ash and oil trucks holding up traffic while loading and unloading.

Purchased Power Helps Solve Financial Problems

1. Purchased power reduces financial burdens.

(a) It eliminates the necessity for making large expenditures for power generating equipment, land, buildings and auxiliaries for permanent or temporary use because the central station industry shoulders this burden.

(b) It accordingly reduces the burden of fixed charges which war against the reducing of prices.

(c) It helps solve the problem of having ready cash to take advantage of better raw material prices, to discount bills or to meet any unexpected demand for funds.

2. Purchased power reduces capital losses.

(a) It eliminates the expenditure of large sums of money in power plant equipment which generally has a greatly reduced re-sale value.

(b) It eliminates the necessity for sinking money into engine foundations, excavations and construction labor from which it can never be recovered.

(c) It eliminates the possibility of having to continue making payments on power plant equipment after the need for such equipment ceases to exist.

3. Purchased power makes it easier for its users to raise money.

(a) It reduces fixed charges or prior liens.

(b) It permits concerns to earn a greater margin of profit.

(c) It helps concerns earn for themselves the reputation of being well managed.

(d) It makes concerns better financial risks.

Purchased Power Helps Solve Accounting Problems

1. Purchased power cuts accounting costs.

(a) The cost of power is covered by a single monthly bill.

(b) It eliminates the necessity for keeping power plant operating records.

(c) It eliminates the extra work of figuring power plant expenditures.

(d) It reduces the accounting payroll.

(e) It permits the acounting department to spend more time on other more important cost accounting studies.

(f) It reduces the time and attention of management required to supervise the keeping of power plant records.

2. Purchased power makes it easier to plan and budget expenditures.

(a) Its cost is predictable because there can be no unexpected expenditures to increase its cost.

(b) It gives an accurate record of total power costs and facilities figuring selling prices.

Purchased Power Helps Solve Personnel Problems

1. Purchased power provides more healthful working conditions and reduces lost time due to sickness.

(a) It reduces smoke, dust and dirt and decreases causes of respiratory ailments.

(b) It reduces noise and resulting fatigue.

(c) It reduces possibility of being overcome by carbon monoxide.

(d) It reduces worry and its detrimental effects.

(e) It improves seeing conditions and reduces eye strain.

2. Purchased power reduces labor troubles and their undesirable effect.

(a) It requires fewer men on the payroll.

(b) It improves working conditions.

(c) It permits more attention to personnel problems.

(d) It permits the payment of higher wages.

(e) It makes for more satisfied workers because of steadier employment and greater earnings.

3. Purchased power attracts and retains high grade employes, and thereby reduces cost of employment and training.

(a) It gives concerns the reputation of being well managed.

(b) It increases the desirability of jobs.

4. Purchased power affords more time for vacations and permits workers to spend more time with their families.

(a) It decreases the amount of night and weekend inspection repair and maintenance work.

(b) It permits management and men to earn more and encourages the granting and taking of vacations.

Customer Benefits Prize Paper

Purchased Power's Appeal to Comfort, Convenience, Safety, Pride and the Pocketbook

By Douglas C. Hornig
Pennsylvania Power and Light Co., Allentown, Penna.

Its Appeal to COMFORT

1. Purchased service is *clean*. Cleanliness is smart merchandising; a spick and span shop attracts customers and makes them feel at home. Employees appreciate a clean place of business. It creates a cheerful atmosphere in which to work.

2. Purchased service is *quiet*. No one likes to buy or work in a noisy place of business. Quietness creates an impression of efficiency. Scientific tests prove that elimination of noise increases worker productivity. Purchased power has no annoying vibrations, either audible or inaudible.

3. Purchased service is *odorless*. There is no danger of offending customers with an unpleasant atmosphere. Employer and employee like to work in comfortable, healthful surroundings.

Its Appeal to CONVENIENCE

1. Purchased service is *easy to get*. There are no long delays when more or less power is needed. For normal requirements, the flip of a switch starts the flow of power, in exactly the amount required. Cold weather or warm has no effect on its availability. Unusual requirements are met with a minimum of delay, with no trouble or inconvenience on the part of the user. The power company is only as far away as the nearest telephone.

2. Purchased service is *easy to use*. No special knowledge is required to make full and economical use of the service. It can be readily adapted to automatic control—doing its job well, with scarcely a second thought. Power can be had when and where it is wanted, to suit the convenience of the merchant or businessman. There is no need to schedule plant or store operation to fit the limitations of the power supply.

3. Purchased service offers *relief from responsibility*. The power company takes over the worries connected with power supply. There are enough petty annoyances in the operation of any enterprise, that break into the day's routine, without adding private power plant worries. And when the unusual does happen, when something arises to threaten continuity or quality of service, it's the power company that takes care of the emergency.

MR. HORNIG

4. Purchased service *protects against "passing the buck."* Responsibility is local and unified—not split between widely scattered companies that can't be reached. Too many cooks spoil the broth. The power company is a local business run by neighbors and associates who have an interest in the community. The management is always readily available and open to suggestions for possible improvements in service.

Its Appeal to SAFETY

1. Purchased service *lowers the fire hazard*. All high temperature prime movers are removed from the factory or store. It eliminates or reduces the supply of inflammable materials that must be kept on hand.

2. Purchased service *removes danger of explosion*. No explosive liquids or gases are necessary to its operation. It needs no high pressure vessels or prime movers.

3. Purchased service *reduces accidents*. Employees aren't subject to hazard from machines used in power generation. Local application of purchased service, where it's needed, reduces complicated transmission devices—always potential sources of accident. Expert engineering advice is available from the power company to keep electrical accidents at a minimum.

4. Purchased service *promotes health*. Clean electric power reduces dirt, smoke, and fumes—breeders of sickness. Quiet, vibrationless operation is easy on the nerves; it helps employees to work at better efficiency all day long.

Its Appeal to PRIDE

1. Purchased service is *modern*. America is living and working in the electrical age. New uses of utility service are constantly being discovered. It never gets out of date; never outmoded by a newer model.

2. Purchased service is *widely used*. Over 95 per cent (*) of present day business and industry uses it. There must be a reason. Numbered amongst the users are the nation's shrewdest, most outstanding businessmen and industrialists—to purchase power is to follow their lead.

(*This figure would vary in different localities.)

3. Purchased service *improves plant appearance*. The electrified business looks clean, compact and efficient. No owner needs to make apologies for his plant appearance. It helps make a show place to which the owner is proud to bring friends and customers.

4. Purchased service is a *quality product*. It offers the best that can be bought at any price. There are no comparable "substitutes."

Its Appeal to the POCKETBOOK

1. Purchased service is *dependable*. It maintains production and protects against frequent shutdowns due to me-

chanical or electrical failure, with resultant loss in output or sales. Reduces danger of spoilage of products in process due to temporary or protracted power outages. Lessens the possibility of business interruption due to fuel shortages, strikes, etc. It enables the merchant and businessman to give his customers good service.

2. Purchased service is *flexible*. There's always plenty of power to take on additional orders. Temporary loads can be added or taken off at minimum cost. Changing processes and methods of doing business mean changes in power needs. Purchased service adapts itself economically to the new requirements.

3. Purchased service is *uniform*. Motors, lamps, and all power-using devices operate more efficiently under uniform, designed conditions. The businessman knows what to expect from his power supply and can plan accordingly. Gets rid of fluctuations in production due to fluctuations in power quality.

4. Purchased service is *adaptable to changing business conditions*. It fits the business cycle like a glove. Assets are kept liquid and the period of obligation is short. When business needs to be expanded, contracted, or abandoned altogether, the businessman is not locked in a policy which admits change only at great expense.

5. Purchased service *relieves danger of obsolescence*. The power company must keep up with the latest developments in private power plants or lose its position in the field. It relieves the businessman of heavy investments in machinery which may become rapidly outmoded. Eliminates the problem of depreciation allowances, of how to write off an investment without a loss due to advancement of the art.

6. Purchased service *conserves capital for vital uses*. The small capital outlay required releases valuable money which may be used for new production machinery or plant improvements. There is no such thing as an absolutely safe investment. Protects against the risk involved in investing in fixed assets not essential to the conduct of the business.

7. Purchased service *protects credit*. There are no heavy or long term fixed liabilities to use up valuable credit. Especially during periods of deflation, credit and cash are available to absorb the shock of falling sales and prices.

8. Purchased service *protects working capital*. Liquid assets are available to pay wages and taxes, maintain inventories, and conduct vital research. Especially during periods of inflation, liquid assets help to meet rising commodity prices and the necessary increased extension of credit to customers.

9. Purchased service *simplifies cost accounting*. Definite, easily determined costs promote budgetary control. There are no large, unexpected costs. Cost allocation amongst various departments is simplified, making it easier to determine profitable and unprofitable operations. Accurate costs are not dependent on arbitrary depreciation allowances. Good records are vital to success in business.

10. Purchased service *encourages economy*. Metered service promotes economical use. Wasteful practices can be readily spotted and checked before they become serious.

11. Purchased service offers *extra employees without increased payrolls*. Trained men are always available to help with technical utilization problems, to suggest ways of building sales or solving vexing production difficulties. They help find markets for products and by-products. The power company keeps a personal interest in business and industry.

12. Purchased service is "best for the long pull." It has the lowest overall cost during the life of the business, through good times and bad. Future trends are favorable. Costs don't increase with time.

13. Purchased service has *no "stand-by" losses*. Power is paid for as it is needed. There's less expense during shut-down periods.

14. Purchased service *gives the businessman "time to think."* Necessary supervision is kept in line with the small percentage which power represents, in the total cost of doing business. Practically the entire time of management may be devoted to important problems—production or merchandising, labor relations, etc. Specialization of executive talents on one business brings greater profits to the owners.

15. Purchased service requires *less man-power*. In addition to a saving in direct operating labor, its use may decrease boiler room attendance and the technical staff required. Added to the saving in wages are all the miscellaneous costs that go with additional employees —workmen's compensation, supplies for the extra men, social security and unemployment insurance, etc.

16. Purchased service *reduces the tax burden*. It makes a direct saving in taxes on equipment and land. Helps out on the corporate net income tax since purchased power is an operating expense, deductible from gross income, while allowable capital depreciation deductions are never sufficient to cover the true cost of making a capital investment in other forms of power.

17. Purchased service *cuts general overheads*. Hidden costs that narrow the profit margin are banished. Helps relieve the burden on the staff organizations—the purchasing, accounting, treasury and legal departments.

18. Purchased service *lowers insurance costs*. Requires no breakdown or accident insurance. Often boiler insurance or plant fire insurance premiums are lowered through its use.

19. Purchased service requires *less valuable space*. It makes room for necessary supplies of goods and raw products —materials on which profits are made. Adequate space is available for production or merchandising operations. The saving in land is especially important in large scale businesses.

20. Purchased service *reduces necessary inventories*. Inventory control is simplified. Reduction in fuel, supplies, and repair parts means less loss due to theft or carelessness. Helps to defeat the bugaboo of business, changing commodity prices and their effect on inventory value.

21. Purchased service *lowers "housekeeping" costs*. There are no destructive vibrations to loosen building joints and weaken foundations. Absence of dust and dirt keeps down the cost of cleaning up, painting, etc.

22. Purchased service has *no nuisance costs*. Smoke and dust control present no aggravating problems. There is no danger of equity suits from neighbors because of objectionable noise, vibration, odors, or dirt.

EDISON ELECTRIC INSTITUTE CONVENTION

JUNE 5-9

WALDORF-ASTORIA HOTEL ***NEW YORK, N. Y.***

Why Should Public Utilities Advertise?

By C. M. Kilian

Advertising Manager, Alabama Power Company

A paper presented before a meeting of the Southeastern Electric Exchange

I AM going to change the title to read, "Why SHOULD Public Utilities Advertise?" You will see that the change in emphasis carries with it the suggestion that perhaps public utility companies should *not* advertise. In fact, the point was raised by the Federal Communications Commission in its recent report on the American Telephone and Telegraph Company.

I believe that there are certain conditions under which public utilities should not advertise. Before giving them, I wish to state that these are my personal views and are not intended to reflect the viewpoint of the company with which I am associated. In my opinion, a public utility company should not advertise, (1) just because other business advertises; (2) merely for the gratification officers or stockholders might enjoy from seeing the company's name, recitals of its accomplishments, and pictures of its plants in print; (3) with the expectation of gaining favor from the proprietors of various advertising media as a result of the mere fact of buying space. Favor so gained would not be worth its cost. If the public utility company gains this favor as a result of its advertising *message* (which should reflect the character of the company), then that is a reward honestly earned in the same manner as other public acclaim.

(4) Prizes for advertising are always welcome and gladden the heart of the advertising manager as well as the hearts of those to whom he is responsible. If these prizes come as a collateral result of a well conceived and well executed advertising effort which has created the impression expected of it—good. But if the prizes result from advertising designed solely to win an award, then the public utility company might do better spending its advertising money for some other purpose.

(5) If a public utility company expects to win goodwill from advertising alone, then it is following a will-of-the-wisp, and money spent for advertising is wasted, because if its policies are unsound, its service poor, its prices exorbitant, its manner of conducting its business generally unsatisfactory, then no amount of advertising will win public acclaim for the company. If you have apples to sell, better remove the rotten one from the barrel before you begin to advertise them.

MR. KILIAN

Recently a utility executive, when asked why he did not repeat certain facts to his customers by means of advertising, replied: "That's been in the newspapers once—they already know it." That leads me to mention that the expectation that a doubt, a conviction or lasting impression can be created by one advertisement or intermittent splurges of a few advertisements, is an all too common viewpoint. The utility company with such a viewpoint is wasting its money on what it imagines to be an "advertising" program, and should therefore, not advertise, at least until the viewpoint of its directing heads changes to where they believe that the only reason Ivory Soap became such a success was because the Ivory people kept saying over and over again, in its advertising, that "Ivory Soap is good soap—it's 99 & 44/100 per cent pure," that people tried it, learned that it was good soap, continued to use it. But how much Ivory Soap do you think would have been sold if the Procter and Gamble Company had said: "Well, we told 'em about Ivory Soap once—they know all about it; why should we tell 'em again?" And don't forget that it's much easier to remember that Ivory Soap is good soap, than it is to remember the many things we want people to know about the advantages a well operated electric public utility company brings them.

(Parenthetically, I should like to state that my Company does not hold the narrow viewpoint I have just outlined and believes in a continuous advertising program.)

Now, let us use the same words as in the original title, and leave the emphasis on the word "should," but rearrange the words to read

Why Public Utilities SHOULD Advertise

(1) If it be true that the more of a product sold, the cheaper its price becomes, the greater the stability of the organization selling it (assuming sound and honest management), the more regular the employment in that business, and if it is true that advertising helps to create a greater demand for a product or service, then a public utility company has a DUTY to advertise—a duty to the public; its employees; its owners.

The exercise of this DUTY to the public will help result in greater volume, and thus lower prices. The greater volume will require more capital investment by the company in productive, transmission and distribution equipment; the greater use by the public can be enjoyed only through utilization equipment. Both kinds of equipment represent taxable property, and thus, through the exercise of its duty to advertise, the public utility company has widened the tax base, so that the public enjoys not only the use of the direct service supplied it by the company, but also those public services it demands which are paid for by taxes.

The exercise of this DUTY to the employee, resulting in more demand for the service the Company has to sell, also results in a demand by the company for more salesmen, more clerks, more engineers and operators and others to help conduct its business efficiently. That means opportunity for employment of capable unemployed, and opportunity for

advancement for present employees in a growing business.

To the owners, or stockholders, the exercise of this DUTY tends to regularize the payment of dividends, both as to amount and time interval.

(2) If it be true that electric service is the great boon that it is generally admitted to be, the electric public utility has a SOCIAL DUTY to advertise, to the fullest reasonable extent of its purse, with the purpose of acquainting all persons within reach of any means of communication, of the benefits resulting from the use of electric service. Did the electric utility not do so, it could be accused, justly, of moss-backism, and a here-it-is, come-and-get-it, it's-not-our-fault-if-you-didn't-know-about-it attitude.

(3) An electric public utility company, especially a southern electric utility company, has an EDUCATIONAL DUTY to advertise to help cure the Nation of its No. 1 "belly-ache" (according to recent reports). Through the performance of this educational duty through advertising, citizens are informed of the resources of the territory served by the utility company. This knowledge spreads in divers ways, directly through individuals and indirectly through organizations. Here and there a new factory, influenced in its choice of location by economic advantages such as transportation, raw materials, climate, labor, etc., starts operations; another area becomes a haven for tourists; a new industry is born; or a new commodity distribution center develops. These all mean more people gainfully employed, who must eat. The farmer must grow more foodstuffs to supply their demands, and as the products of the farm are sold, the farmer has more money, so eats more satisfyingly, and there's nothing better for a stomach ache resulting from hunger than a good square meal.

(4) The electric public utility as a taxpayer and "a citizen wherever it serves" (and if it is not now, it should be) has a CIVIC DUTY to advertise. Those un-American viewpoints which would usurp the right of reasonable freedom in the conduct of honest business; the right of expectation of reasonable reward for a business risk honestly and advisedly taken; and the right of a citizen to look toward his government for protection against unwarranted invasion of the rights of citizens, may be first directed against utility companies and affect them first. That happening, they

(*Continued on page* 70)

"Bill Jones," Utility Employee, to Be Dramatized at New York World's Fair

Bill Gillen, power house worker, portrays "Bill Jones," average Consolidated Edison System employee, typical of 37,000 electric, gas and steam workers in the metropolitan area, who will be dramatized by a New York World's Fair 1939 exhibit of the Consolidated Edison Company of New York, Inc., and affiliated companies, first exhibitors to announce employee exhibit plans.

Thirty-one years old, Gillen is an oiler, second grade, in the utility system's 1,000,000-hp. Hudson Avenue Station, the largest steam-electric generating station in the world. In the photo, which will be used in designing the fair display, Gillen is shown atop a huge turbo-generator in the Hudson Avenue plant. An all-time high standard of living has been achieved by "Bill Jones," according to display studies presenting the first "average employee" picture ever released by the utility group. His health is rated "more than 30 per cent better than that of the nation's average industrial worker; his wages are at an all-time high level; expressed in terms of purchasing power his wages buy one-third more of the good things and necessities of life than they did at the peak of prosperity in 1929; his other needs are served by extensive job training, insurance, safety, savings and home ownership program." His life story suggests an up-trend in the living standards which, Consolidated Edison fair committeemen say, will receive increasing attention in the "World of Tomorrow."

Distribution Transformer Load Testing Methods Used by the Detroit Edison Company

By W. E. Groves
The Detroit Edison Company

A paper presented before the Transmission and Distribution Committee, E. E. I., Rochester, N. Y., Feb. 9-10

THIS paper will deal only with the procedure and method of testing and securing load data on distribution transformers and will not enter into any discussion of the economical loading of transformers.

We will first deal with our Detroit District. This is an area of approximately 226 square miles and is made up of the City of Detroit, several small suburbs, and a few small unincorporated areas. The district is divided into eight areas with a field engineer covering each one. He is responsible for transformer loadings, voltage conditions, and the electrical design of the overhead distribution in his particular area.

About the latter part of September, each field engineer makes up a list of the distribution circuits in his area in the order in which he desires the transformers tested. In addition, a large map of the Detroit District is prepared with red lines drawn along business streets, indicating where we desire that the transformer tests be made on Saturday nights.

This list of circuits and the large map is forwarded to our Overhead Lines Department. They, in turn, order a blue print of each distribution circuit from our Map Division which outlines streets, primaries, and shows all lighting and power transformers on the circuits. This information is then forwarded to the supervisor of the ten two-man test crews that operate out of three warehouses.

The actual testing is begun about October 15 with a minimum of one test crew working in each engineer's territory. The testing period runs through the winter until about March 1.

When making spot or instantaneous ammeter checks, the test crews start work at noon. Since we bank our transformers, it is necessary to inspect the fuses on all of the transformers in any one bank before any tests are made to be sure that none of the transformers is carrying an abnormal load due to one or more transformers having dropped their load because of blown or defective fuses. This fuse inspection is made in the afternoon during the daylight hours. Any defective equipment is noted on the transformer test slip, together with the size of transformer, number of transformer, street or alley location and distribution circuit number.

The starting time of making the actual tests varies from about 6:20 p.m. in October to 5:30 p.m. in December, and again goes back to about 6:20 p.m. at the end of February. The last test in the evening is generally taken about 8:30 or 8:45 p.m. The test crew records the load in the two outside legs or secondary trainers of each transformer as well as the load in the two outside secondary wires on one side of the transformer location, thus giving us the load on the transformer and the direction of the load away from the location. In addition to the load checks, a spot voltage check is made from each outside trainer to the neutral at the transformer location. This latter is of considerable aid in checking the primary voltage regulation over the entire circuit.

These spot tests are made with a split core current coil and a portable ammeter with a connecting cord long enough so that the meter can be kept on the ground.

A two-man test crew will average testing twenty transformers a night during the entire test season. The tests cost about $1.30 to $1.35 per transformer tested with wages at the rate of $2.94 per hour for the crew and a $3.00 per day truck charge.

We have used this method of testing loads on transformers since about 1914, or for the past twenty-five years. It proved a very satisfactory method for determining transformer loads before the extensive use of the electric range, major appliances, and motors for refrigeration and heating devices in the home.

About 1926 it became apparent that the spot test was not securing adequate load data in certain areas where the electric range load was growing quite rapidly. It can be seen that the spot tests starting at 6:20 to 6:30 p.m. in October were completely missing the range load, and that even the December and January tests starting at 5:30 p.m. were catching the range load on only a few of the transformers tested each evening.

Accordingly, in the fall of 1936 a few of the regular indoor Lincoln Demand meters were procured from our Meter Department. Two meters of the same size were installed in a wooden box for protection from the weather. This box was hung on the pole and each meter connected in series with a transformer trainer by connecting the meter leads across the terminals of the transformer secondary fuse and removing the fuse link during the twenty-four hour test. Since these meters were connected directly into the secondary circuit, several sizes of meters were required to test the various rated transformers. The meter leads had to be large enough to carry full line current and were cumbersome and heavy. The number of transformers tested by a two-man crew with this equipment dropped to around twelve or fourteen per day with a consequent rise in cost to about $2.00 per transformer tested. Much of this rise in cost was due to the fact that any one set or box of two meters was limited to testing only one or two sizes of transformers. With the size meters we had on hand, I believe the largest size transformer we were able to test was a 37½ kva, carrying about 10 per cent overload. This necessitated coming back into the area with a spot test crew to pick up the larger transformers.

In the spring of 1937 we equipped one test crew with Maximeters. The Maximeter is a combination of a Lincoln Demand meter in an aluminum case

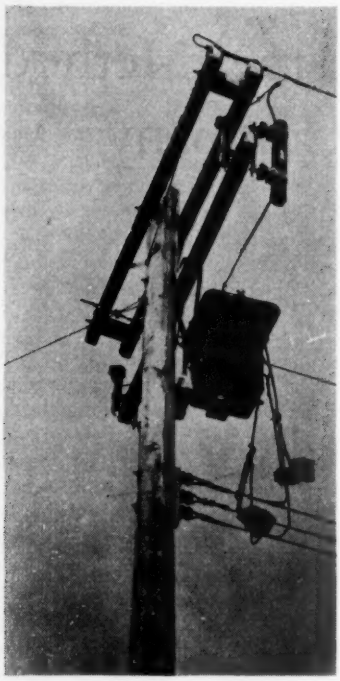


Fig. 1 — Installation of Maximeter on Transformer Pole

mounted directly on a weatherproof split core current transformer and the whole unit can be installed on a transformer location by simply clamping it around the transformer secondary training wire. Figure 1 shows a typical installation in Detroit. A short rope sling is attached to each meter and it can be noticed that these are tied to the training wires above the fuse blocks to keep the meter assembly from dropping to the ground in case the fuse block should pull or burn apart. On other types of installations where the secondary is above the transformer on crossarms, the sling may be tied directly to the secondary line wire, the crossarm, or some other pole fixture.

The Maximeter lends itself very readily to testing in areas where the transformer sizes vary considerably. It can be installed on a 10-kva transformer one day and installed on a 100-kva transformer the following day by merely changing the current transformer taps.

With the demand meter type of equipment all of the test work is done in the daytime on the regular eight-hour shift. This is much appreciated by the test crews and eliminates dark encounters on back lot lines and easements with none too friendly dogs, not to speak of the occasional meeting up with policemen with drawn guns, looking for the prowlers some nervous citizen has reported in the neighborhood.

The Maximeters have proven so satisfactory that this year we have six of the ten crews in the Detroit area so equipped. The number of transformers tested by a two-man crew equipped with Maximeters is seventeen per day, making an average cost of $1.55 per transformer tested. We believe this cost will be lowered when all of the test crews are equipped with these meters and have become more experienced in their use. Since nearly all of the test cost is represented by labor, costs should vary in different localities nearly in direct proportion to the prevailing wage.

The above cost does not include any fixed or maintenance charges on the metering equipment. It costs about $1,360.00 to equip one crew with Maximeters as against $200.00 for the equipment necessary to make spot tests. We have not had enough experience to determine maintenance cost, but believe it will be small. We have had very little trouble so far and our Meter Laboratory reports that they are quite a rugged instrument.

Our total cost to test the load on approximately 15,500 lighting transformers in the Detroit District last year was $23,000.00, or an average cost of $1.48 per load test. This test was made with one crew using Maximeters, three crews using the Lincoln meters installed in the wooden boxes, and six crews making spot tests.

The load test is not the only benefit derived from this expenditure, however.

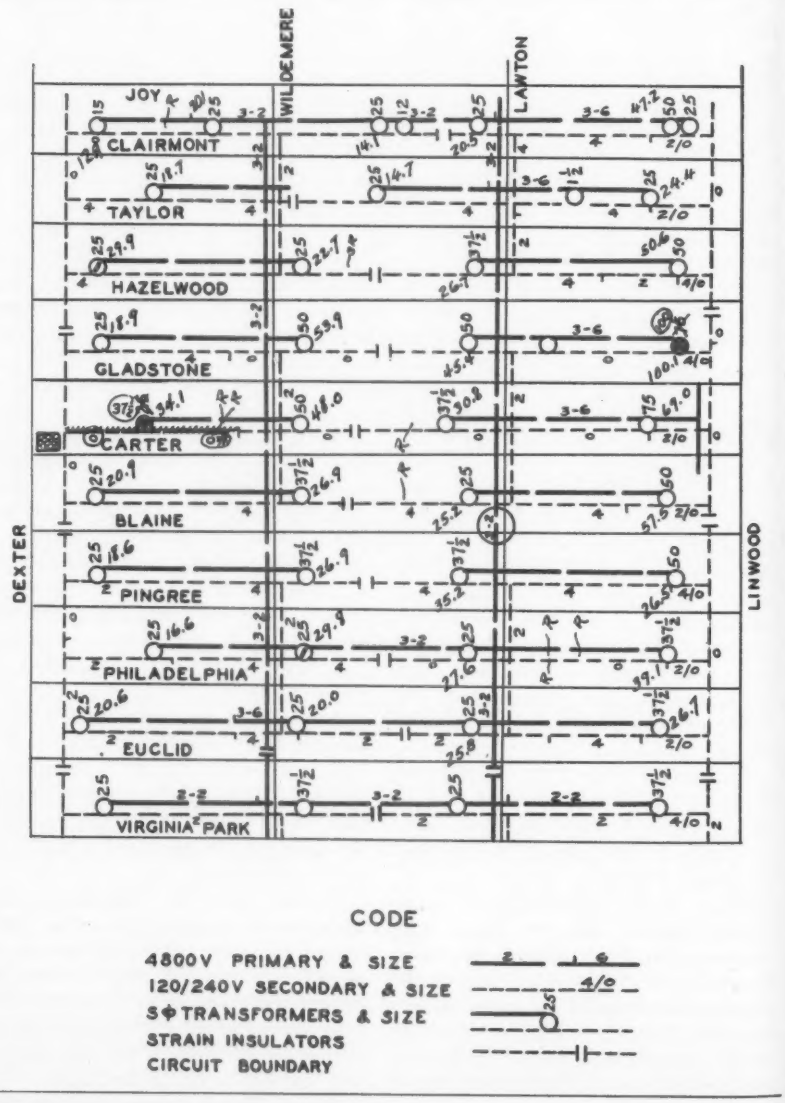


Fig. 2

As a result of the inspection made at the same time, we pick up on the average the following defective equipment:

Defective lightning arresters	200
Broken primary transformer bushings	100
Broken secondary transformer bushings	50
Open or broken ground leads	10
Moulding off ground leads	1,500
Defective transformers	20
Broken primary and secondary insulators	130
Defective crossarms	100
Broken guy wires	100
Service wires crossed	1,000
Service brackets off buildings	600
Defective primary fuse holders	50
Defective secondary fuse holders	300
Blown transformer fuses	400

Clearing the distribution system of this defective equipment undoubtedly saves much in service interruptions and trouble costs.

The test crews turn in the test slips each night at the warehouse, and the Overhead Lines Department forwards them on to the Planning Engineer after noting all defective equipment reported so that replacements may be made directly.

Each field engineer in the Planning Division keeps the load record of the lighting transformers on special distribution circuit maps which show only one line streets, primaries, secondaries, and transformers. The load is noted on the map alongside of the transformer location. When all of the test loads have been recorded on the map, it gives a very clear picture of the load condition on the entire circuit, and since the transformers are banked it especially shows the loading of each transformer in respect to the others banked on the same secondaries. This is important as it is necessary to know this load relationship with the neighboring or adjacent transformers to guard against cascading or blowing the fuses on the entire bank in case any transformer in the bank should drop its load due to defective leads, fuses, or other equipment. Any changes in transformers due to increased loads or overloads are noted on the map by crossing out the old size and marking in the new size with a red pencil. During the year following the testing period, all changes or additions to the primary and secondary are noted on this map with a red pencil as well as any additional transformers which may have been added. New loads of any size, such as ranges, water heaters, etc., added to the secondaries since the load test are also noted on the map with an ordinary lead pencil. Thus, by the time the next test period arrives we have a complete picture of all additions and changes to the overhead distribution made during the year (in red), together with major load additions as well as the picture of the circuit when the last load test was made. When the new test period arrives, new black line and white surface prints are obtained and the process is started all over again. The old maps are filed away for reference and provide a rather complete picture of load growth which gives us a good check against any errors which may be made in the current year's test. Figure 2 shows one of these maps covering a well built-up area. Naturally, a map in a rapidly growing area in an outlying district would show many more changes and additions to the distribution. To facilitate the printing of this figure in the BULLETIN we have crosshatched all secondary and transformer changes and encircled all numbers indicating change of size of the new equipment instead of our usual practice of putting these figures and changes on the map with a red pencil. As an example, note that new building at the corner of Carter and Linwood Avenues and our replacement of a 25 kva Sø transformer with a 37½ kva and also the changing of the No. 4 secondary to No. 0 wire to accommodate the increase in load. The total load on the new transformer setup is shown as 34.1 kva.

Fig. 3—Overhead Lines Load Measuring Instruments—Maximeter and Graphic Ammeter

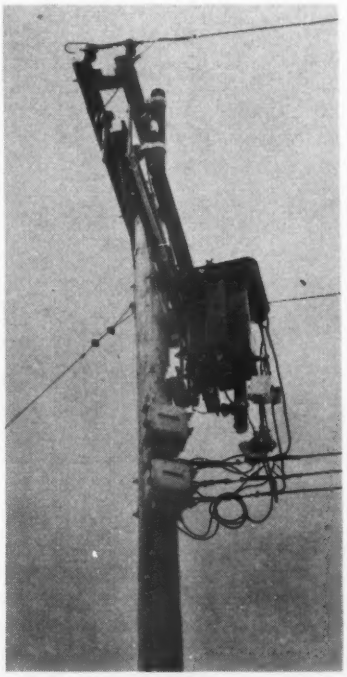


Fig. 4 — Installation of Graphic Ammeters and Maximeters on Transformer Pole

The average transformer loading of all transformer capacity, including transformers supplying three-phase commercial power loads, on the distribution circuits in the Detroit District last year was 66 per cent. This figure was arrived at by dividing the total connected transformer capacity into the sum of the peak loads of the distribution circuits after subtracting the demand of customers fed directly from the 4800-volt primaries. About 15 to 20 per cent of the connected transformer capacity is used to serve the three-phase commercial loads which do not add materially to the peak load of the circuit. This loading varied from 93 per cent in the well built and developed areas to 35 per cent in the outlying areas where we have many small transformers installed to insure proper voltage (ice box flicker, etc.) rather than for load carrying purposes.

To insure a more accurate interpretation of test loads, we installed Lincoln curve drawing meters on thirty transformer locations during the winter of 1936-1937 feeding various classes of residential and commercial load. A few

were left on during the summer months to get comparisons between summer and winter loads. The data secured from these curves is being digested and arranged in such a manner that we hope to arrive at rather definite factors to interpret test loads taken at any time during the winter months into the actual maximum or peak loads on the transformer.

Figure 3 shows a close up picture of a Maximeter and also one of the weatherproof curve drawing Lincoln meters. The iron bracket shown is nailed or lagged to the pole and the meter suspended with one bolt from the short right angle projection. This allows the meter to be rotated to some extent to a position where charts can be changed easily.

Figure 4 shows a pole installation of two Lincoln curve drawing meters with two Maximeters clamped over the transformer training wires serving as current coils.

We do not pretend to have arrived at any final conclusions regarding seasonal or day to day load factors, but will show the following curves simply as a matter of interest.

The top set of curves in each figure shows the actual load values as taken from the charts in the field. The solid lines show the peak load value for six days each week, Sunday loads being omitted. The peak values shown are the average of the three highest consecutive hourly load values taken from the recording Lincoln meter charts and correspond to the average load over a two-hour period. The lower set of curves show the same two-hour peak load values arranged by days of the week. These values have been corrected to a slight degree to account for abnormal conditions that arose during the six month testing period. In addition, on the lower curve we have indicated the maximum values reached each day by small dashes. These maximum values correspond to the same value which would be secured by installing a set of Maximeters for the twenty-four hour period. These maximum values have been smoothed up a bit to make a smoother curve. However, it was not necessary to change any of the values more than a plus or minus 2 per cent to effect the smoother curve.

All of the values are given in per cent of the two-hour peak load of the year which generally fell on Christmas or New Year's Eve.

Figure 5 is a composite curve showing the combined loads of four transformers serving 151 houses, three small stores, and one gas station. The houses are good middle class, six to eight rooms each, averaging fifteen to eighteen years of age, with a 6.6 per cent electric range saturation. It is interesting to note that the heaviest loads occur on the first three or four days of the week and that the maximum load values in October practically all fall between 80 and 90 per cent of the yearly three-hour peak.

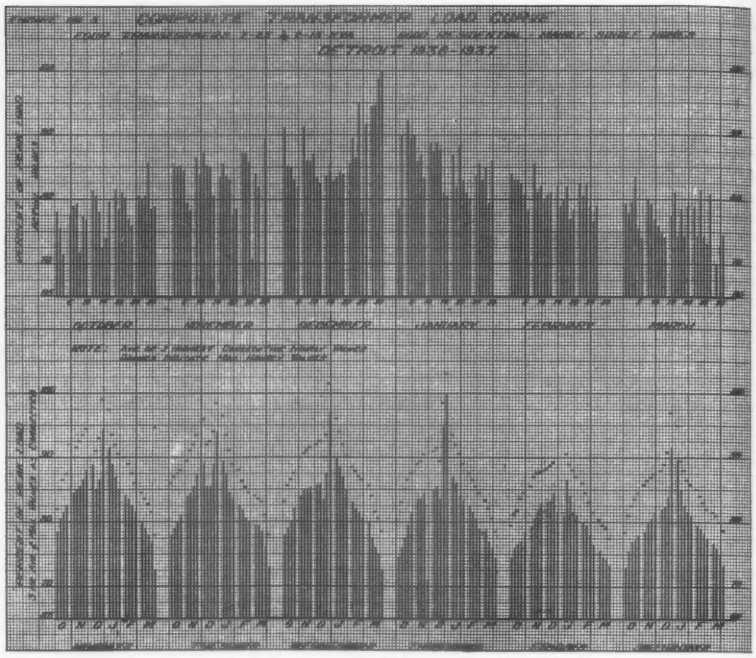


Fig. 5

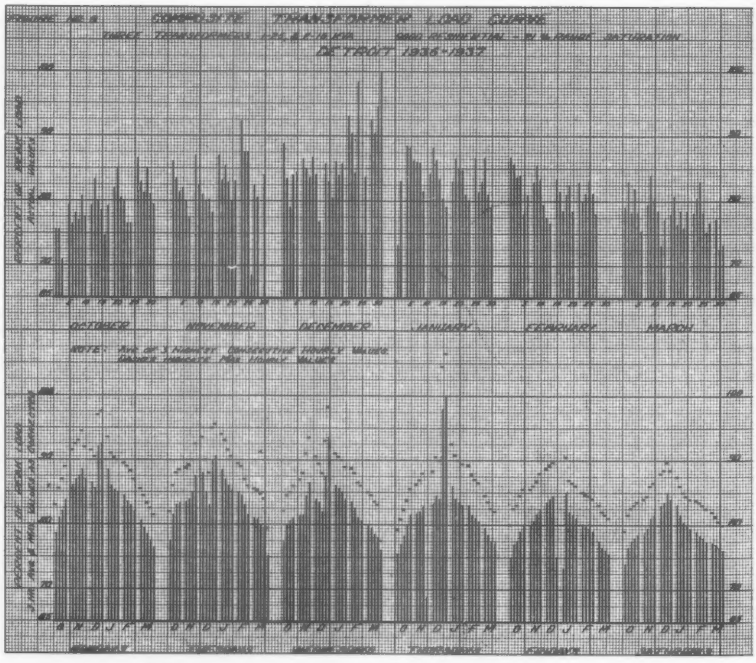


Fig. 6

Figure 6 is a composite curve showing the combined loads of three transformers serving 76 houses, thirteen two-family flats, and three very small apartments. The houses are good middle class, six to eight rooms each, with an average age of twelve to fifteen years, and having a

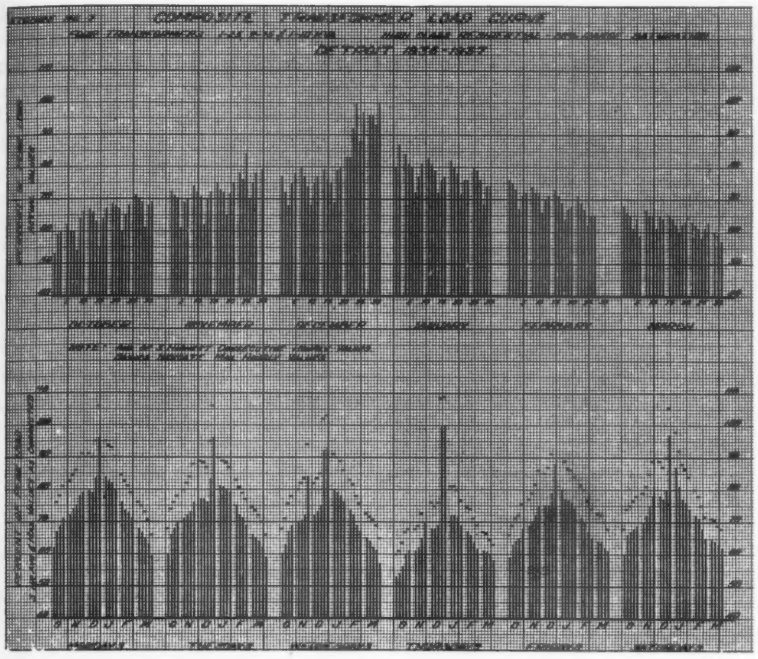


Fig. 7

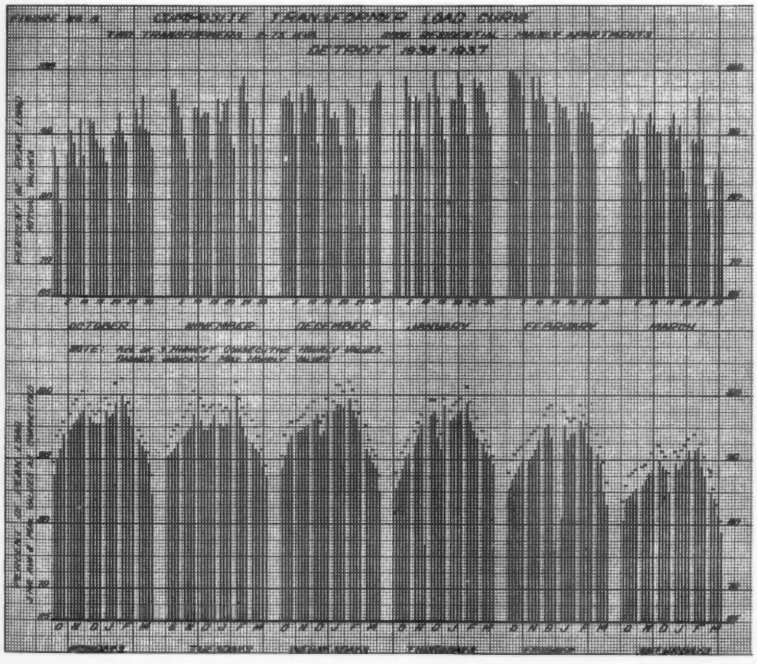


Fig. 8

21 per cent electric range saturation. Note that, in general, the maximum values and daily two-hour peaks are 2 to 3 per cent higher in respect to the year's two-hour peak than they were in Figure 5 covering the same class of houses, but having a lower range saturation.

Figure 7 is a composite curve showing the combined loads of four transformers serving 74 large modern houses, of seven to twelve rooms each, with a 28 per cent electric range saturation. These locations were all taken from the areas referred to, by our local politicians, as the silk stocking districts. It is particularly interesting to note the effect that the "maid's day off" has on the Thursday loads. It should also be noted that the maximum values and two-hour daily peaks in respect to the year's two-hour peak are considerably lower than in Figures 5 and 6, most of the maximum values falling between 70 and 90 per cent of the two-hour year peak.

Figure 8 is a composite curve showing the combined load of two transformers serving a heavy large modern apartment district and some business load. Note that the load is quite consistent and the maximum values and two-hour daily peaks practically all fall between 90 and 100 per cent of the yearly two-hour peak load with the exception of Saturday night. It is interesting to note that the maximum two-hour peak loads occur during cold weather periods in January and February instead of during the Christmas week. This may be due to the fact that the population of the area where these loads were taken is mostly of Jewish nationality with a consequent reduction of the usual Christmas season influence on lighting loads. It may also be due to a large proportion of apartment dwellers being employed in commercial enterprises where the hours of employment extend well into the evening during the holiday season.

Figure 9 shows the load carried by a single transformer serving fourteen modern two-story stores and twenty-four houses. The business load consists of drug, grocery, dry goods, shoe, and dime stores, toggery, and children's wear shops with professional offices on the second floor. Note that the largest loads of the year occur on Saturday nights, Thanksgiving Eve, and the week before Christmas. However, we have found a definite load pick-up on Friday nights in a few locations due, no doubt, to the forty-hour week, resulting in the traditional Saturday night shopping being done on Friday night. It is interesting to note that the maximum values on Saturdays are very little higher than the average two-hour loads since the Saturday load curve is quite flat from a half hour before dark until 9:00 p.m. when the stores and shops start to close. This curve explains, as mentioned earlier, why we request that load tests on transformers serving business frontage be made on Saturday nights.

Figure 10 shows the evening load curves of the combined loads of four transformers serving good middle class homes. The hourly values are plotted in per cent of the two-hour peak for the year. The top set of curves show the characteristic load curve for the second week of December and the bottom

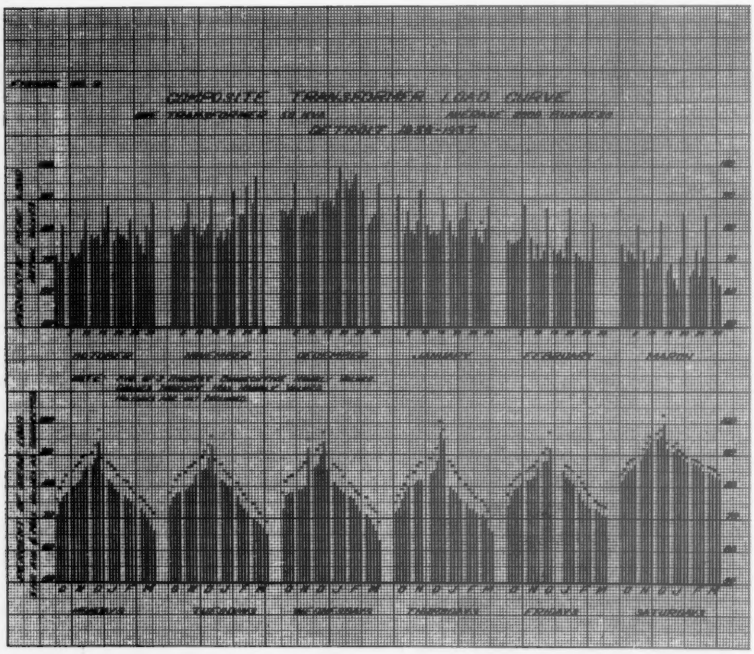


Fig. 9

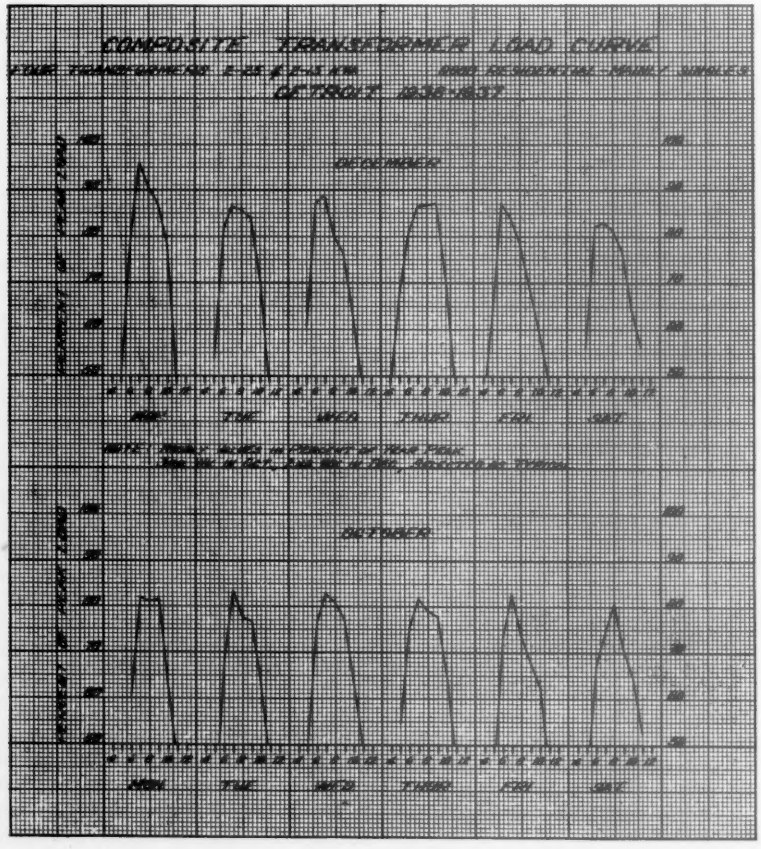


Fig. 10

curves show the loads for the third week of October. The maximum load shown on each evening curve is the same value which would have been obtained by a Maximeter installed for that particular evening. It can be seen that spot tests taken on eighteen or twenty transformers during the evening starting at 5:30 p.m. in December or 6:00 p.m. in October and ending at 8:45 p.m. would show very inconsistent results. Load tests secured in this manner could vary 20 to 30 per cent depending on the particular time of the evening the test was made. We are persuaded that the Maximeters are giving us very consistent results, and with the aid of such curves as shown in Figures 5 to 9 we will be able to determine the yearly peak load to a fair degree of accuracy.

We would remind you again that these curves are possibly not yet in their final form as our investigation is not completed.

We have installed several of these curve drawing meters on transformers again this winter to check the information obtained last year. We realize that the rapid increase of the use of electricity in the home and business places will require more or less constant investigation of loads to keep any such load factor curves up to date.

As an aid to anticipate sudden and unaccounted for increases in loads which might cause serious overloads on transformers, we are in the process of setting up a study to compare the increase in kilowatthour consumption for small groups of customers from month to month. Our Billing Department can supply us with the total kilowatthour consumption of groups of approximately two hundred customers for each month or two month billing period, as the case may be. This represents the average number of customer accounts in a single ledger.

Since the billing is accomplished by modern machine methods, this data can be furnished at the very small cost of approximately $50.00 per year for the entire Detroit District. It simply means running a group of punched cards through a tabulating machine which will print the ledger number, the number of customers, and the current kilowatthour consumption. These groups of customers do not conform in any sense to the groups of customers fed through any single transformer. However, we believe comparing current year with past year consumption over like periods of time, we shall be able to seek out the locations where the load increase has been the greatest and secure actual load tests in these areas in the fall of

(*Continued on page* 79)

Field Testing of Distribution Transformers

Methods of Controlling Load and Voltage

By J. A. Tenbrook and L. R. Gaty
Philadelphia Electric Company

A Paper Presented Before the Transmission and Distribution Committee, E. E. I., Rochester, N. Y., Feb. 9-10, 1939

FIELD testing of transformers is a single step in a sequence of operating procedures that must be followed in order to control the loading of distribution facilities.

While the primary purpose of this paper is to discuss "Distribution Transformer Field Load Testing" it is believed that field testing must be portrayed against a background of control practices in order to present an adequate description of equipment and methods.

The Philadelphia Division of the Philadelphia Electric Company has the following distribution transformers in service:

Distribution Transformers — 1938, Philadelphia Division

Overhead	No.	Kva
13200-2300 .....1 ϕ	488	107,175
2300-115-230 .....1 ϕ	7,603	247,120
Constant Current..6.6 amp	522	11,007
2300-230 .....3 ϕ	11	272
In Buildings		
2300-115-230 .....1 ϕ	131	8,997
Subway		
2300-115-230 .....1 ϕ	1,344	99,354
Total 10,099		473,925

The design of distribution facilities and responsibility for loading and voltage is assigned to the Estimating and Detailing Section of the Transmission and Distribution Division. While this work is spread over a total of 12 designers the work required to police distribution loading and voltage is equivalent to continuous employment for four men as follows:

Administrative (checking records and initiating field tests).....1 man
Electrical layouts for changes to correct voltage or load conditions .....2 men
Detailing layouts for construction forces .....1 man

A card record of distribution transformers is maintained and filed by locations. Each card carries a symbol indicating the nature of the load served as indicated in the schedule at the top of the next column.

Class	*Predominant Load*	*Number in Service*
R	Residential	4,241
B	Business	835
P	Industrial Power	3,132
		8,208 *
X	Street lighting, network units and installations on special applications such as 13,200-2,300 units	1,891
	Total	10,099

*Does not include network transformers in Central District.

Load data is recorded on these cards whenever a test or survey is made. In September of each year the cards are pulled from the file and a test program prepared. Selection of units for the test is based on the following schedule:

A—Overhead
1. Residential transformers with estimated loads or previous test exceeding 125%
2. Business transformers with estimated loads or previous test exceeding 100%
3. Transformers not tested for 5 years .....

B—Underground
1. All transformers with estimated loads or previous test exceeding.. 90%
2. All transformers not tested for 5 years .....

Industrial transformers are not included in the routine test schedules. Loading of these transformers is watched by checking the monthly billing demands and contract demand changes. All proposals for increased or reduced load limits are checked by the Estimating and Detailing Section and an estimate of construction costs submitted to the Power Sales group if additional capacity is required.

Permissible loading of distribution transformers is determined by the December load conditions. One and one-half hour peaks of 165 per cent are permitted on overhead transformers. However, the flattening out of our evening load curve has reduced the load limit to 145 per cent for practically all cases. In addition we find that voltage regulation generally forbids loading beyond this limit. Subway transformers are limited to 100 per cent loads or the thermal equivalent thereof.

In order to reduce the burden of transformer testing during peak months a schedule of correction factors has been developed from field tests that permits the testing period to extend from September to May.

Characteristic curves showing the relation between customers annual consumption, December consumption, and the customers average ½ hour component of transformer peak loading have been developed. With this curve as a base transformer loads may be estimated from the kilowatt hour registrations obtained from the customer billing section. By checking demands in this manner unnecessary load surveys are kept to a minimum.

Transformers testing above 140 per cent are checked to determine if the voltage delivered to the last customer is less than 110 volts.

In connection with this check a field survey is made and a sketch prepared showing the number of residences and the size of secondaries. These sketches are filed by locations and are used to supplement future load surveys. To date approximately 40 per cent of the total transformers have been surveyed.

System reenforcement orders are initiated on transformers testing over 145 per cent or when delivered voltage is less than 110 volts.

System reenforcement jobs and new installations are designed to give a minimum of 112 volts. New work is coordinated to the end that minimum permissible voltages will not require transformer changes before maximum loading is reached.

Field Testing: Orders for field testing of transformers are dispatched to the

Service Maintenance Section. One crew of two men and a light car is kept continuously employed from September to May. In addition other troublemen may be assigned to testing during any slack time period during the 24-hour day.

A Lincoln Ampere demand (type AD) is the basic instrument used for testing. The meter is inserted in the neutral lead of the transformer, in shunt with the tap connector between the transformer lead and the line. The tap connector is then opened up. Meters are left in service for 48 hours. The troubleman making the test records:

1. Indicated load at time of removal
2. Maximum indication on sweep hand

During 1938—1,800 thermal demand tests were made and in 90 cases these were supplemented by graphic ammeter tests. Graphic ammeter tests are made by the same crews that do the normal testing. A split core current transformer is placed over the secondary leads and a graphic ammeter mounted on the pole.

Field testing costs are as follows:

Test with Lincoln Demand ammeter—2 men complete 14 installations and removals per day

Labor	1 1/7 manhours @ $1.50	$1.71
Transportation	1 1/7 manhours @ .28	.32
Checking and Calibrating Meters		.05
Material (Tap Connectors and Tape)		.02
		$2.10

Testing with Split Core and Graphic Ammeter—2 men complete 6 installations and removals per day

Labor	2 2/3 manhours @ $1.50	$4.00
Transportation	2 2/3 manhours @ .28	.74
Checking and Calibrating Meters, Charts, etc.		.10
		$4.84

The investment per test meter is $12 for the Lincoln meter, and $100 for the split core and graphic ammeter.

Transformer testing in our Suburban Divisions presents some slight variations from Philadelphia practice. These variations are the result of somewhat different conditions. In the Suburban areas the average transformer is 11 kva as contrasted with 33 kva in the city. Load increases are greater in terms of percentage increments and the problem is complicated by spotty building as contrasted to the tendency of city builders to open up block areas by means of mass production. The suburban areas do not generally have available a continuous shift of troublemen to use on testing.

There are in service in the suburban areas 18,133 distribution transformers totaling 200,000 kva capacity. During the year 1938—3,169 tests were completed at an average cost of $2.25. Testing was performed from October 15 to December 15, employing two-man gangs consisting of a lineman and an Engineering Assistant. Tests were made between 6.00 p.m. and 7.30 p.m. Instruments used were the split core current transformer and indicating ammeter, Tong Testers, and the Lincoln Maximeter.

There is a saturation of 12 per cent for ranges and 5 per cent for water heaters in the Suburban Divisions as contrasted to 2 per cent for ranges and 1 per cent for water heaters in Philadelphia.

The Suburban Divisions, however, have a complete secondary record on which such loads are indicated. This record is kept on 11¼ x 14 cards. Each card represents the secondary mains and services from one transformer. This record has proven invaluable in controlling transformer loading in a rapidly growing territory.

When Maximeters are used they are installed and removed by service crews.

The trend of opinion is toward the increased use of the Maximeter or the Thermal Ammeter now used in Philadelphia.

Results of test program:

Transformers are loaded up to 145 per cent as a regular practice without any impairment of service as evidenced by the following results (1938 report):

Philadelphia Division	**Justified*	**Not Justified*
High Voltage Complaints	32	196
Low Voltage Complaints	145	170
Transformers Burnt Out by Overloads—Philadelphia	2	(See Note 1)
Transformer Fuses Blown—All Causes (Aerial and Underground—Philadelphia)	145	
Transformer Fuses Blown Other Than Lightning (Philadelphia)	80	

Note 1—Transformers Overloaded—Philadelphia: Aerial—7½ kva—Wishart Street 3rd pole East Amber Street—Industrial customer's demand increased beyond contract limits without notification to company.
Underground—50 kva—Southeast Third and South Streets—2—50 kva in parallel—failure of one caused overload on other.

Transformers Burnt Out by Overloads—Suburban 2 (See Note 2).

Note 2—Transformers Overloaded—Suburban: One of the 2 transformers burnt out was a 3 kva. Transformers of this size are not tested as they usually serve only a single customer.

* A complaint is classified as justified when the delivered voltage is less than 110 or more than 120.

From studies completed to date the following conclusions are presented:

1. Built in Thermal indicators are difficult to justify. The indications of such devices must be subject to the same supervision and analysis as is necessary with present test data. Such devices would require field surveys and if accurate results are expected probably should be test checked. A certain percentage would be in error and require replacement or calibration in the field. If a device were developed that was absolutely perfect and would give an accurate demand integration over some predetermined time interval the only saving per transformer test would be due to the slight reduction in time required to insert the present meters in the transformer leads. On the basis that we are now testing an average transformer once in five years this saving on each test would have to be adequate to pay carrying charges over the whole five year interval between tests. During 1938—$4,000 was spent on field testing of transformers in Philadelphia. This represents 40c per transformer or 85c per kva. On the assumption that a built in load recording device of proper characteristics were available and that it would save one-half of present field testing time it would have to sell for not more than $1.20 to be economically desirable.

2. The growth of range, water heater, and air conditioning loads will require more complete detail in secondary records than has been required heretofore. Knowledge of the saturation of these appliances per transformer is necessary to interpret either connected load data or test results.

3. Distribution load control is a field that should be covered as a definite responsibility of an individual or group. An intimate contact with the problem is necessary to keep abreast of the constantly changing conditions that are encountered.

EDITOR'S NOTE: Data supplementary to this paper have been prepared for use as a guide to designers in laying out improvements and in interpreting test data. These supplementary data will be reproduced with this paper and included in the minutes of the Transmission and Distribution Committee meeting.

Missouri Valley Electric Association

The Missouri Valley Electric Association has planned three conferences to be held during March and April. These meetings are as follows:

Rural—Sales Conference, Kansas City, March 30 and 31.

Engineering Conference, Kansas City, April 6 and 7.

Accounting Conference, Kansas City, April 27 and 28.

Salvage Methods of the Detroit Edison Company

By Kenneth C. Campbell
The Detroit Edison Company

Presented Before the Joint National Accounting Conference of the Edison Electric Institute and the American Gas Association, Chicago, Ill., Dec. 12-14, 1938

THE methods used by the Detroit Edison Company in their Salvage Division were partially described in publications issued in 1929, 1931, and 1932. It is intended in this paper to review them and to bring these methods up to date with the addition of any methods developed during the interim.

A great improvement has been effected during the past year by gathering together under one roof all salvage operations of a shop nature and all salvage material and equipment awaiting disposition. This was made possible by the use of an abandoned powerhouse. The turbines, boilers, auxiliaries and miscellaneous equipment were cleared out and the building was cleaned, painted and slightly altered. The use of this building is in itself a salvage achievement.

Many of our former methods have been improved in the last ten years and new lines of activities have been taken on. Our accounting set-up now gives us such a breakdown of our expenses by groups of operations that any which develop an unprofitable trend can be quickly detected and corrected. A monthly "Salvage Report" is compiled to record our activities in detail and afford a comparison of volume and efficiency of operations.

During the last four years we have made an increasing use of old employees from other departments who were no longer able to carry on their regular duties, also employees of all ages who are recuperating from physical and mental ailments. Some of the latter are returned to their respective departments if they recover sufficiently. Whether these men stay with us or return to their original departments we feel that we allow them to retain their self-respect by keeping them gainfully employed and we regard this as "human salvage." This branch of the work has been very satisfactory both from the utilization of these employees and from the cost and quality of the work performed. An appendix which accompanies this paper will give a good idea of the nature of the operations.

The Salvage Division of this company which is a branch of the Stores Department has a wide scope of duties in connection with salvage matters. All materials and equipment retired from plant are turned over to the Salvage Division as soon as the write-offs are made. We supervise the actual removal and disposition of materials in most cases and this has involved the dismantling of entire powerhouses and substations. Scrap is disposed of directly from the point of removal and items which are to be retained for sale or further use are transferred to our Salvage Headquarters. All sales are under the supervision of the Purchasing Department.

During the years 1935 and 1938 inclusive our volume of salvage business has averaged close to the million dollar mark. This includes salvage sold outside the company, and salvage materials and equipment reconditioned, and used within the company. The Salvage Division has become a dependable source of supply for many departments of the company and the items produced by them are subject to stringent inspection the same as purchases from outside vendors. Our success in salvage work has been greatly due to the fine cooperation of our engineers and our using departments. They have become "salvage-minded" to the extent that they give full consideration to the possible uses of salvage materials and equipment on all their projects.

Accounting Routine for Handling Salvage Material and Equipment

General

An inadequate or unsatisfactory accounting set-up hampers the development of a salvage organization. It was the experience of this Company that although the accountants worked with the Stores Department from the start of the organized salvage activities, the work grew so rapidly and assumed such importance that the accounting structure became inadequate. There will be some who wonder why any special attention should be given to salvage matters and a brief review of the situation may be in order.

The crediting of miscellaneous small lots of salvage to various accounts does not present any large problem in either the physical or accounting side. If the volume of material is greatly increased and the costs of salvage are to be kept where they should be the troubles begin to show up. Take, for instance, several small lots of cable from various jobs which should be run through the salvaging operation together as a matter of economy. Every effort should be made to allocate to each job the credit for its proper proportion of reclaimed material, but it is equally true that this procedure should be compatible with proper accounting and reasonable salvaging costs.

Storekeepers and accountants can well afford to thrash these matters out and it will be found they can be satisfactorily settled without violating any accounting principles or running contrary to stipulations of regulatory bodies. Salvage work has branched out into too many lines to be ignored. It covers not only the routine crediting and preparation of metals for sale, etc., but also the utilization of parts of various apparatus, the alteration of apparatus for other uses, the manufacture of various items from salvage, and other matters that ordinary accounting routine does not cover. It is recommended that storekeepers doing this kind of work check over all their physical operations in connection with salvage and follow up every accounting step in connection with each operation. When this is done they will be in a position to ask for certain additions to their accounting routine and for a revision of those accounting requirements which hamper their efficiency. The result of perfect coordination between the accountant and the storekeeper should be a well balanced routine in which salvaging economy may be combined with accounting accuracy. There is no doubt that a satisfactory agreement can be reached.

The accounting system set up for the segregation of the various classes of salvage expense in this Company has been kept as simply as possible consistent with furnishing the costs of performing different kinds of salvage operations. A description of the Work Orders set up to gather the various costs is given.

Cost of Salvaging Overhead Lines Material

The work order for the cost of salvaging overhead lines material is a clearance

work order in the Materials and Supplies series with a job number for the various classes of work done. This work order is assigned in the Materials and Supplies series because the material worked on is stock material the recovery value of which is high. Following are the job number assignments:

Work Order 522 A 3 Job
1. Line Wire (splicing, dipping, etc.)
2. Line Hardware
3. Poles and Log Heels
4. Crossarms, Spacing and Heel Blocks
5. Overhead Street Lighting Equipment
6. Line Wire (Scrapping)
7. Insulators
15. Miscellaneous Overhead Line Material
20. Portion of General Stores Expense
50. Credit for Value of Material Salvaged
99. Charges for redistribution of net salvage credit to proper removal and maintenance accounts (Used by Accounting Dept.)

The Stores Department through its time reports, stock requisitions, and purchase orders allocates the expense of salvaging Overhead Lines material to the proper job numbers and credits Job 50 with all material turned back into stock. The Accounting Department makes a monthly entry charging Job 99 and crediting the various maintenance and removal work orders of the Overhead Lines Department with their proportionate share of the net salvage recovery, thus clearing the entire salvage work order.

Cost of Salvaging Lead Covered Cable

A similar work order procedure is used in securing the cost and recovery value in salvaging lead covered cable. This is also a clearance work order in the Materials and Supplies series because the metals recovered are placed in stock pending their sale.

Work Order 522 A 4 Job
1. Cost of Salvaging Cable
2. Credit for Value of Lead and Copper Recovered
20. Portion of General Stores Expense
99. Charges for redistribution of net salvage credit to proper accounts

The Accounting Department distributes the net recovery value monthly to the proper accounts of the Underground Lines Department.

Cost of Salvaging Miscellaneous Material

A third work order has been set up to take the costs of all miscellaneous salvage work not covered by other work orders. Some of the material salvaged under this work order is returned to stock, but the majority is non-stock material. Hence the work order assigned is a clearance work order in the Retirement Reserve series.

Work Order 576 A 8 Job
1. Miscellaneous Underground Material
2. Underground Street Lighting Material
3. Material for Sale as Scrap
4. Material Stored for Sale or Re-use
5. Structural Steel
15. Miscellaneous Expense not Otherwise Covered
16. Handling, Packing, Receiving, and Shipping
17. Maintenance of Salvage Equipment
18. Supervision and Clerical Work
99. Charges for redistribution of cost of salvaging to other accounts

Removal work orders are issued by the Property Department for all removals of property of any consequence. When such material or equipment is salvaged the resulting credit is given directly to the removal work order. The same procedure is followed when the work order to be credited is an operating or maintenance expense work order. Material returned to stock is priced at average stock prices. Material and equipment re-used is priced at original property value in making transfers between accounts.

The Stores Department sends to the Accounting Department monthly a distribution of the salvage expense in this work order to each of the work orders receiving credit. In this way the expense and credit reach the accounts of the departments turning in the material and the salvage expense accounts are cleared.

Stock Material Written Off

Stock material which is to be scrapped is written off to a Retirement Reserve work order 576 A 7 Job 1. Stock material which is written off to be held for sale or for some possible future use within the Company is charged to work order 576 A 7 J 2. The General Storekeeper approves all such write-offs and, in addition, special authorization is obtained from the management for write-offs exceeding $2,500 in value. Credits for the amounts realized from the sale of scrap metals recovered from such material and from the sale or re-use of items intact are made directly to the respective job numbers to which the material was charged when written off.

The cost of salvaging stock material written off is charged to the proper job number under work order 576 A 8 covering the cost of salvaging miscellaneous material and is redistributed monthly to the stock write-off work order. Annually the Accounting Department clears the net charges remaining in work order 576 A 7 Jobs 1 and 2 into the proper classification of the Retirement Reserve account.

Difference Between Stock Value and Selling Price of Scrap Metals

Most of the scrap metals are placed in stock at present market value as they are produced to stay there pending their sale. The prices of such stock metals are adjusted to the market monthly. When the metals are sold any difference between the stock value and the selling price is charged or credited to work order 576 A 4 Job 1, a Retirement Reserve series work order which is cleared monthly by the Accounting Department into the various accounts contributing the metals sold.

General Stores Department Expense Chargeable to Salvage

Stores Department expense of a general nature, such as trucking expense, a portion of executive and supervisory salaries, and clerical expense which is applicable to the handling of all material and equipment removed from Company service is charged to work order 576 A 3 Job 1, another Retirement Reserve series account. The Stores Department furnishes the Accounting Department monthly a redistribution of this expense, a portion of it being chargeable to the various Salvage Division accounts and the balance going to various special removal jobs.

Repair of Distribution and Street Lighting (Pole Mounting) Transformers

The reconditioning and repair of distribution transformers and constant current street lighting transformers for pole mounting is done in the Salvage Division. A work order, 49 B 11, under the Maintenance of Distribution System series is assigned to the Salvage Division for the cost of this work which consists of routine inspection, bushing and lead replacements, tank cleaning and painting, and replacement of burned out coils. Work Order 49 B 11 does not have to be cleared and no credits are made for the transformers repaired since they are brought on a capital account and remain there throughout their life.

Repair of Tools

The cost of repairing tools for the Overhead and Underground Lines Departments is charged to separate job numbers under the work orders assigned to these two departments for their tool costs, which are considered overhead expense items. Credit for repaired tools returned to stock is made to the job number covering the cost of new tools.

APPENDIX

Details of Salvage Operations in the Delray Salvage Shops

Section I—Wire Reclamation

Wire Sorting—Copper, aluminum and steel guy wire removed from the Overhead Lines System is delivered to warehouses where it is placed on trays for shipment to the Delray Salvage Shops. This material is weighed by the shipper and checked in at the receiving point to forestall any possible theft.

On receipt of the wire it is sorted for length and prepared for splicing by skinning the ends, removing the bent sections and removing old joints. The short lengths of soft drawn wire 42″ to 8′ in length are separated out and later cut into tie wires.

Wire Storage—After preparation in the sorting division the wire is delivered to wire storage division where it is sorted onto trays according to its size, hardness, length, condition of braid and nature of salvage operation. Full trays of wire ready for the various operations are accumulated in the storage division until the workmen are ready for them.

W. P. Wire Stripping Machine—When the braid of W. P. wire has become worn and ragged and cannot be reclaimed by dipping in insulating varnish, the braid is then removed by drawing the wire through a machine which cuts the top of the braid and by dragging the wire over a scraper at the front of the machine the braid is removed from the conductor. The copper is then coiled into coils of approximately 350 lb. each and returned to wire mills in carload shipments for rebraiding. The old insulation is disposed of as rubbish.

Butt Welding Machine—This machine is capable of welding solid copper wire from number 8 B and S to 4/0 B and S. The copper wire is cut in a cutter which gives a special shape to the ends, which during the welding operations allows the oxides and dirt to flow to the outside of the weld. The ends of the wires are butted together and held in place by the jaws of the machine. The flash guard is then lowered and the foot pedal pushed down which closes an auxiliary switch, allowing the current to flow in the conductors fusing the ends of the conductors together and at the end of the travel the jaws cutting off the current and allowing the weld to cool. Hard and medium hard conductors are then annealed in a special annealer at the top of the machine relieving the stress at the weld. Wire to be redrawn at the wire mills has all joints dressed down to the size of the wire.

Aluminum and Copper Wire Splicing—The rolled sleeve method of splicing is used for aluminum wire the same as is used for copper wires. The aluminum strands are fanned out from the steel wire and the steel wire is painted with red lead paint, after which it is coated with carborundum dust and the aluminum strands wound back in place. The conductor is then inserted in an aluminum sleeve and rolled in a Kearney Splicing Machine. For copper wire a short copper sleeve is rolled directly onto the wire. The copper sleeve is a Detroit Edison development. It is tapped inside with British standard nut threads. A sleeve thus tapped has the same holding power as a plain one four times as long.

Joint Testing Machine—To maintain specified standards of strength for wire joints samples from the day's production are tested each day. Each month representative samples of all sizes of wire are sent to the Research Department, which tests and submits a report to the Engineering and Overhead Lines Departments for their approval. These daily and monthly checks eliminate possible error from faulty rolls and welding technique.

Wire Reeling Machine—Standard wire reeling machines are used to coil and reel wire after it is spliced. Special fixtures which allow the coils to be removed with the minimum of effort and time are used to reduce handling costs. These machines are controlled by the operator from a push button station allowing supervision at the pay-off table or at the reeling machine. A special wire straightener installed on the transverse gear is used to iron out the many kinks and bends in the wire.

Stripped Weatherproof Wire—Large quantities of copper wire are returned to the wire mills each year for reinsulating. The solid wire in the smaller sizes is usually shipped in coils while the larger sizes of stranded are shipped on reels. The wire manufacturer then redraws when necessary, anneals and reinsulates as specified by the shipper.

Tie Wire—From the short lengths of soft drawn wire sorted from the incoming trays in the sorting division, tie wires, pigtails for ground rods and transformer extension leads are cut to length and tied in bundles in this division. The machines for cutting this material were made from old punch presses and equipped with shear knives. The length of the short pieces of wire vary from 42″ to 30′.

Wire Dipping Tanks—Weatherproof wire braid which shows signs of deterioration is reimpregnated with a rubber base insulating varnish. Coils of wire are placed in the tanks on racks and then covered with varnish and allowed to soak a short time. The varnish is then drained from the tanks and hot air blown through the coils for drying purposes.

Section II—Furnace Operation (*Including Stripping of Lead Cable*)

Wire and Cable Storage for Furnace Operations—After wire for splicing pigtails and tie wires has been sorted out in the sorting division, the left-overs are placed on trays and stored for burning in the salvage furnace. Each tray load represents one furnace charge and the charge is removed from the trays by forks on an electric truck. The copper recovered is then pressed into large bales of approximately 6′ x 3′ x 3′ dimensions and then sold as No. 1 copper. Cable, joints, pot-heads and miscellaneous materials are stored in a like manner and the technique required for each item carried out.

Salvage Furnace—This equipment is used for the burning of weatherproof covering from wire, the removal of paper from cable, the melting down of lead cable sheath, preparing transformer cores and coils for dismantling and incineration of miscellaneous materials and equipment requiring removal of braids and compounds.

Each furnace is composed of three parts; a combustion chamber in the rear, a burning chamber in the middle and a cleaning chamber in the front. The control of smoke is an important function in a furnace of this type. It is controlled by drawing the unburned gases through a fire brick checker work preheated by an oil burner. The heated gases pass into the combustion chamber where additional air is admitted completing the burning process.

Materials are charged into this furnace by electric trucks. After the burning process is completed the material is pulled out of the burning chamber into the cleaning chamber where it is cleaned by compressed air from air lances held by furnace operators. In the melting of lead an auxiliary torch is used allowing the molten lead to flow into an electrically heated pot. When the pot is full it is transferred on a monorail crane to pig moulds where the lead is poured into the moulds.

Salvaging Scrap Lead Covered Cable—Lead sheath cable is received from the field in approximately 6′ lengths. The lead sheath is removed by passing through power driven knives which split the lead sheath into 2 equal parts allowing removal of conductors and insulation. Afterwards the lead sheath is melted into pigs and the insulation is burned from the conductors. Mechanical removal of lead sheath insures a copper product free from lead.

Salvage Furnace—After the lead sheath has been removed from cable by a mechanical stripper it is melted in the furnace by an oil torch. The molten lead is drawn off into an electrically heated pot and later transferred into pig moulds.

Section III—Transformer Repairing and Rebuilding

Inspection and Repairing of Distribution Transformers—All distribution transformers removed from the Electrical System are sent to one central plant for inspection, general overhauling and testing before being reinstalled. Burned out transformers have new cores and coils installed and the many repair jobs are done by a competent staff in this division.

Inspection and Repairing of Distribution Transformers—Washing of transformer cores and removal of oil from tank is accomplished by pumps, the old oil being drawn into one tank for purification and the core washed with reclaimed oil from another tank.

Inspection and Repairing of Distribution Transformers—Repairs such as new leads and bushings, replacing burned out coils with new cores and coils, are made on distribution transformers.

Inspection and Repairing of Distribution Transformers—All transformer tanks needing painting are painted with a spray gun in a ventilated paint room.

Inspection and Repairing of Distribution Transformers—After transformers have been inspected, painted and repaired short weatherproof wire leads (salvaged in wire division) are soldered onto transformer leads to allow for tapping onto overhead conductors.

Inspection and Repairing of Distribution Transformers—All transformers are given standard potential test on receipt in the warehouse and after being inspected or repaired.

Inspection and Repairing of Distribution Transformers—Transil oil pumped from transformers is circulated through a Sharple's oil machine, then passed through blotter press for final removal of moisture, after which it is pumped into storage tanks to be reused.

Inspection and Repairing of Distribution Transformers—One of the many repair jobs done on distribution transformers was the cutting over of 2,000 three phase transformers to single phase. These transformers were star connected on the primary side and delta connected on the secondary side. One leg of the three phase transformer was shorted, both on the primary and secondary side of the coils. The turns on the primary side of the two remaining coils were reduced in number to allow connection in series of these two coils. The secondaries of the two coils were connected in parallel, making a 2 wire 220V/4800V transformer. These transformers were used on small power installations with 80% of their former rated capacity.

Section IV—Reclamation of Small Items (*Bench Work*)

Reclamation of Small Materials—In this room reclamation of many small salvage items is carried on by a special group of men. These men are old employes who have been retired but who prefer to work, incapacitated men, and men recuperating from some form of illness. Each man is provided with a small work bench and proper tools to carry on the activities that are delegated to him. Special lighting, ventilation and facilities are provided to make these employes as comfortable as possible. No production schedule is carried of this group, each man doing what he is able and willing to do but he is always supplied with a quantity of work that will occupy his time during the day.

Reclamation of Bolts—All bolts are first sorted for size and for condition of galvanizing. Bolts that have marred threads are reconditioned by a special split die which is clamped on the threads and is run backward off the bolts instead of cutting the thread onto the bolts in the usual manner. This process protects the galvanizing, also pushes the threads back into their original position. New nuts are installed and the specification for this class of material calls for all nuts being run up and back the full length of the threads on the bolts. This is one of the jobs carried on by the special reclamation group. Bolts requiring regalvanizing are either hot dipped galvanized or zinc sprayed.

Bolt Threading Stock and Die—This tool was developed for the purpose of protecting the galvanizing but at the same time straightening out marred threads on bolts. The tool is clamped on the bolt where it is necessary to clean out or to straighten the threads and is run backward off of the bolt instead of onto the bolt.

Reclamation of Lightning Arresters—This work requires the replacing of broken caps, splicing of leads and making of miscellaneous external repairs. Internal mechanism of lightning arresters is not disturbed and in no case are they rebuilt. After completion of repairs they are given a dielectric and a surge test to check the operating characteristics. This work is carried on by a special reclamation group.

Insulator Reclamation—Suspension insulators are thoroughly cleaned and inspected for flaws in the hardware. Necessary replacements of parts are made and standard assemblies are fabricated. In all work carried on by employes in this special group, advantage is taken of their past experience where possible. This makes the work more enjoyable to the men and they feel that they are still serving the Company in their original trade.

Section V—Tool Repairing

Tool Repair Shops—Modern machines for repairing all types of Overhead Lines tools are provided in this division of the salvage operations. Hand, cross cut and circular saws are filed and set; handles for hammers and sledges are installed; tree trimmers are sharpened and new poles are installed; and many other such operations for this type of equipment are performed.

Overhead Lines Tools—The large quantity and variety of tools used in Overhead Lines construction provides a large amount of work for the Salvage Shops. All tools are repaired and returned to stock as good as new.

Section VI—Scrap Metal Preparation for Selling

Alligator Shear—In dismantling of salvage equipment the alligator shear is a very essential piece of equipment. As metal specifications call for metals to be sheared into 10 in. lengths this equipment performs two functions, one the dismantling of the equipment into its component metal parts and the other the preparing of the metal into a saleable form. Practically all small equipment can be dismantled by this machine.

Magnetic Separator—Copper, brass and non-ferrous borings and turnings received from machine shops are contaminated with iron. To get the maximum price from this material the iron is removed by passing the material through a magnetic separator. This machine is also used for removing the steel wire from aluminum wire. It is prepared by shearing into short lengths, which allows the strands to separate and as the wire passes through the machine the steel is removed.

Metal Baler—To reduce storage space for light and bulky metals they are usually baled and stored in this form.

Incandescent Lamp Disposal—In Companies where free incandescent lamp renewal policies are in force large quantities of lamps have to be disposed of watchfully. This is to keep to a minimum the theft of old lamps which might be used for renewals the second time. This machine is capable of handling ten million lamps every year and is so constructed that the operating expense is at a minimum.

This machine has a revolving cylinder constructed of two shells. The inner shell is perforated to allow the broken glass to pass through to the outer shell where it travels to an opening and out into containers provided for the broken glass. The brass from the bases is retained in the inner shell and removed through a door in the end of the cylinder. This brass is sold as light yellow brass and more than pays for the expense of operation.

Scrap Metal Storage—After scrap metal has been sorted into the various kinds and classifications it is stored until quantities and the market justify sale. Pieces and chunks are stored in metal containers. Certain wire, thin sheets and bars are stored in bales, line wire in large bundles, and lead in pigs.

Section VII—Woodworking Operations

Wood Working Operations—In the operation of the Stores Department large quantities of crates, boxes and reels are used. This division repairs reels, constructs new reels and manufactures crates and boxes. Salvage lumber from old boxes and transformer crates is used when possible.

Spacer Block Manufacture—After the usable crossarms have been sorted out the defective arms are sawed into spacer, heel and miscellaneous blocks used in Overhead Lines construction. The value of blocks recovered equals approximately the value of the crossarms.

Section VIII—Waste Paper Baling

Waste Paper—Paper and cartons are collected from all offices, warehouses and Company buildings and delivered to the Delray Salvage Shops where it is baled into two grades, office mixture and cartons. The separation of the two grades is a profitable operation as the carton stock sells from $2.00 to $3.00 more per ton than the office mixture.

Waste Paper Storage—After the bale of paper or cartons has been removed from the baler and weighted it is stored in a room separate from other materials, to give the necessary fire protection to other operations.

Section IX—Pole Reclamation and Salvaging

Wood Pole Reclamation—All poles removed from the Overhead System are brought into pole yards where they are inspected and reclaimed as standard poles, farm line poles or are cut up into firewood and breasters.

Wood Pole Reclamation—Poles that have not been butt treated and have not deteriorated to such a degree that they can not be made into farm line poles are shaved free of all decayed wood and given a hot creosote oil treatment.

Wood Pole Reclamation—Where the ground line has deteriorated beyond reclaiming the pole in its original length and the pole is large enough at the new established

ground line it is cut back to next longest length or cut back to a guy stub.

Wood Pole Reclamation—After all salvage operations have been performed on the pole as the removal of decayed wood, cutting back into shorter lengths and framing the pole is given a standard hot and cold creosote oil treatment.

Wood Pole Reclamation—When tank is not in use proper safety methods are taken to protect the personnel working in these operations.

Wood Pole Reclamation—After the useful part of the pole is salvaged as a pole or cut into breasters the remaining sections are cut into firewood and used in heating warehouses situated at these poleyards.

Wood Pole Reclamation—The pole butts and short pieces of poles left over from the salvage operations are fired into a flue type boiler and furnish heat for the warehouses at these pole yard locations.

Section X—Lead Cable Reclamation

Lead Covered Cable Reclamation—Duct splicing and inspection plant is equipped with reeling machines and cable turning devices.

Reel turning devices were manufactured from salvage parts from a dismantled power plant. The bearings and shafting were purchased from a used equipment company, the gears, chain, speed reducer, motor, pipe and steel for frame work were salvaged from above plant.

Cable received from the field in long lengths is passed through a sand blasting machine which prepares it for inspection for holes in the lead sheath.

The cable is pulled along the inspection line where minor repairs to the sheath are made.

The short pieces of cable are duct spliced together to make man-hole lengths.

After the insulation has been applied a piece of lead is lead-burned onto the sheath making a joint approximately the same size as the cable.

Section XI—Handling Scrap Iron

Scrap Iron Handling Methods—Scrap iron on construction projects and at power plants is stored in loading boxes and when carload quantities have accumulated are loaded into cars.

When the boxes are filled with scrap iron they are picked up with a crane and placed in cars for unloading.

After placing in car end of box is removed by crane and the box load of iron is dumped into car.

Section XII—Spray Galvanizing

Reclamation of Overhead Lines Hardware—Removed Overhead Lines hardware is collected in trays awaiting galvanizing.

In the regalvanizing of overhead lines materials it is essential that all rust be removed. This is accomplished by an air blast and finely crushed steel shot.

After cleaning by blast zinc spray is sprayed on the material by a special gun. Any metal can be deposited by this apparatus.

Overhead lines hardware which has been regalvanized by the spray method meets company specifications.

Section XIII—Miscellaneous Operations

Equipment Reclamation—To conform to engineering changes some types of equipment are rebuilt into more modern equipment. These items may either be changed in the salvage shops or be shipped back to the manufacturer who makes the necessary changes. One of these items changed by the manufacturer was a 72 kva indoor type induction regulator which was rebuilt into a 30 kva outdoor type regulator.

Brazing Lead on Ground Rod—Large quantities of ground rods are used in every electric public utility and as the conductor has to be soldered, clamped or brazed onto the end of this rod, the Salvage Division takes advantage of this situation and installs short pieces of salvage wire reclaimed in the wire division. This provides an outlet for several tons of wire which would normally be sold as scrap each year.

Heating Equipment—Resistance heating equipment is used for sweating off copper lugs and other soldered items of this nature.

Magnesia Blocks—The broken pieces of magnesia pipe covering received from removal jobs are ground and mixed with water to form a mortar. This mortar is then cast in pans and dried in a hot air oven. This material is used for lining preheated air ducts in power plant construction.

Conduit and pipe straightening machine—This machine is used for the straightening of pipe and conduit received in the Salvage Shops from removal jobs. It was constructed from an oil governor cylinder from an old turbine.

The bent section of the pipe is placed in V blocks and the air admitted into the cylinder by the operator from the end of the bench by a two way valve. This control allows the operator to control the pressure at all times and being at the end of the object being straightened allows him to know when the operation is complete.

Pipe Reclamation—One of the large items of reclamation is the redrawing of boiler tubes into pipe of varying dimensions. This material is used on all jobs when black iron pipe is specified.

Pothead Dismantling Oven—In removing compound in the dismantling of large potheads it is necessary to gradually raise and lower the temperature so as not to stress the porcelain bushings. An electric oven was designed to remove the compound from equipment of this type.

Small Items of Manufacture—One of the items of manufacture is the lead expansion sleeve which is moulded from scrap lead recovered from cable.

Solder Manufacture—In all electric work large quantities of solder are used and from these items returned to salvage, as cable joints, sealed ends from cable, lugs and miscellaneous equipment, the soldered section is recovered and reused in the manufacture of new solder.

The solder sections are melted and an analysis is made to determine the tin content of the mixture. After the tin content has been determined, additional tin is added to bring the mixture up to specifications and then it is cast into bars or pigs according to requirements.

Handling of Salvage Materials—The large quantities of materials received in the salvage shops require that they be handled with the minimum of expense and with dispatch. This class of material should be processed as soon as received. By the use of electric trucks, trays and shop pans these materials are reworked or scrapped within a few days after receiving in the salvage shops.

Section XIV—Handling and Storing

Sorting Salvage Materials—The first operation on receiving salvage materials is to sort them into their many types and classes. They are then delivered to the division working on this class of salvage work.

Handling of Salvage Materials—The large quantities of materials received in the salvage shops require that they be handled with the minimum of expense and with dispatch. This class of material should be processed as soon as received. By the use of electric trucks, trays and shop pans these materials are reworked or scrapped within a few days after receiving in the salvage shops.

Outside Storage Facilities—Where possible, certain classes of salvage material such as street lighting poles, street lighting fixtures, pipe poles, ladders, rubbish and other miscellaneous items of this nature are stored outside of the salvage shops. This relieves the cramped condition which would develop if material of this sort were stored inside the shop while it is being processed.

Salvage Warehouse—Facilities are provided for the storage of salvage items held for company use or sale. These items include the many pieces of equipment used in an electric utility system. One of the large pieces of equipment in the warehouse is a 45000 kw turbo-generator. All items carry a salvage stock number and a record of the complete technical description is kept of each item in the warehouse office.

Packing of Salvage Materials—Items reclaimed in the Salvage Shops are packed in cartons, boxes or crates and labeled with the proper description.

Shipping of Salvage Materials—After all work is completed in the different salvage divisions the material is transferred to the shipping department, where it is disposed of by the Stock Control Division of the Stores Department.

Section XV—Miscellaneous Functions

Salvage Displays—Salvage displays contain samples of all the usual products of the Salvage Division and in the cases of reclamation contains not only a sample of the reclaimed product but also one of the item as received from the field.

Testing Laboratory—The testing laboratory is under the supervision of a competent test engineer who reports to the General Test Engineer of the Electrical System.

General Office—A combined Salvage and Stores Department office is used to keep the expenses of these two divisions at a minimum cost. Salvage office men perform such functions as timekeeping, ordering supplies, keeping transformer records and preparing reports of work accomplished.

Locker and Lunch Room—Proper lunch and locker room facilities are provided for all salvage employes.

Philadelphia Electric Company Employee and Automobile Accidents Decline Sharply

By Roy M. Godwin

THE Philadelphia Electric Company has a personnel of about 7,000, with about 15,000,000 man-hours per year. This company has accomplished during the past ten years an 87 per cent reduction in lost time accidents, and a 71 per cent reduction in days lost due to accidents.

On January 1 the following awards were made to major divisions of this company for excellent performance in the reduction of employee lost time accidents:

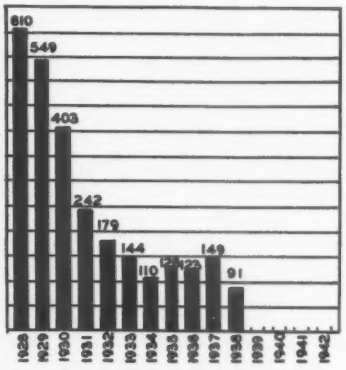
14 Honor Certificates. These are awarded to divisions accomplishing a no lost time accident record for the entire year.

6 Merit Certificates. These are awarded to divisions accomplishing a reduction of 25% or more as compared with their previous year's record.

The company operates a fleet of 875 automobiles, covering about 9,000,000 miles per year in urban and interurban traffic.

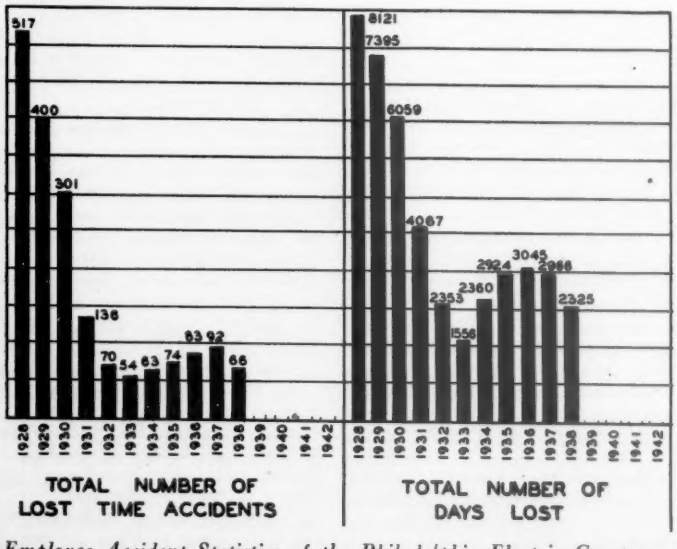
This company has accomplished during the past ten years an 85 per cent reduction in accidents for which their drivers were in any degree responsible.

On January 1 the following certificates were awarded to drivers who have not had an accident for which they were in any degree responsible. Responsibility is assigned after a complete investigation of the accident.



Automobile Accident Statistics of the Philadelphia Electric Company. Number of Negligent and Contributory Negligent Accidents

6	men	received	14-year Pres. Certificates
2	men	received	13-year Pres. Certificates
1	man	received	12-year Pres. Certificate
5	men	received	11-year Pres. Certificates
105	men	received	10-year Pres. Certificates
44	men	received	9-year Certificates
71	men	received	8-year Certificates
62	men	received	7-year Certificates
64	men	received	6-year Certificates
72	men	received	5-year Certificates
51	men	received	4-year Certificates
89	men	received	3-year Certificates
94	men	received	2-year Certificates
187	men	received	1-year Certificates
853	Total		



Employee Accident Statistics of the Philadelphia Electric Company

Certificates signed by our President are awarded to all drivers who have accomplished a record of ten years or over.

The foregoing data indicates that the Philadelphia Electric Company is doing its share toward a reduction in employee and traffic accidents.

Why Should Public Utilities Advertise?

(*Continued from page 56*)

will in greater or lesser degree, adversely affect other business, large or small, and —should those viewpoints result in political control and operation of business, the citizen, whether in business or not, will lose the right to *regulate* business, and in place of that right, find himself regulated, to irksome degree, by political fiat.

(5) While an electric public utility company theoretically enjoys a monopoly in its field, that is known not to be true, except possibly in the case of residential electric lighting. The electric public utility therefore has a PROTECTIVE DUTY to guard against the loss of markets and investments for those who have invested their money in it. Advertising to keep users of the utility's service informed of its merits, is a part of this protective duty.

(6) If it be true that a public utility company is a public servant (and I believe most of them consider themselves that) then it has a FIDUCIARY DUTY to perform. It should inform its employer—the public, and its owners —the investors, of the manner in which it is performing its duties as a public servant and as the trustee of the funds of others, so that they may judge if those duties are being performed to the best interests of all concerned. The best and cheapest means of performing the fiduciary duty is by means of well conceived, honest, simple, easy-to-understand advertising.

This might bring us to the question "What is a good public utility advertisement?" Briefly, I would say that it is that kind of an advertisement that does the job expected of it in the performance of one of the duties I have enumerated in the foregoing paragraphs, regardless of whether or not it wins the praises of typographers, art critics, and others who may judge an advertisement by its form, rather than by its function.

Twelve Utility Employees Awarded Edison Electric Institute Medal for Resuscitation in 1938

By Mae B. Woods

Secretary, Committee of Judges, Edison Electric Institute Medal

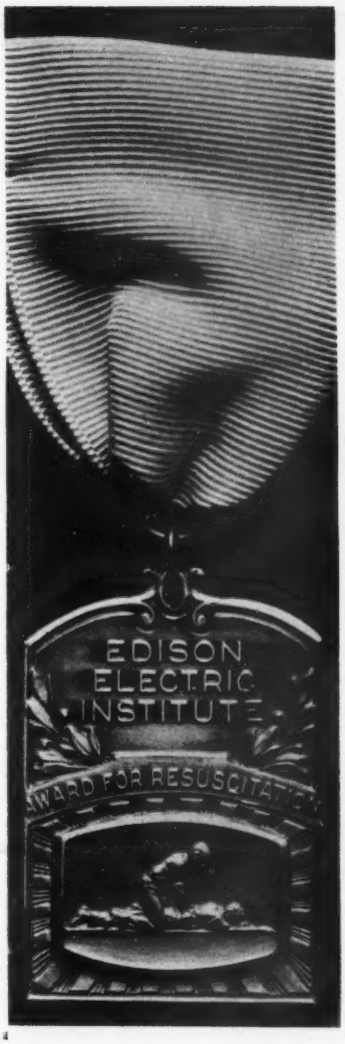
TWELVE Edison Electric Institute Medals for Resuscitation by the Schafer Prone Pressure Method were awarded to employees of members companies of the Edison Electric Institute during the year 1938. Three of the Medals were awarded in Pennsylvania, two each in Virginia and Washington, and one each in the states of Massachusetts, Vermont, Texas, Arkansas and Maryland.

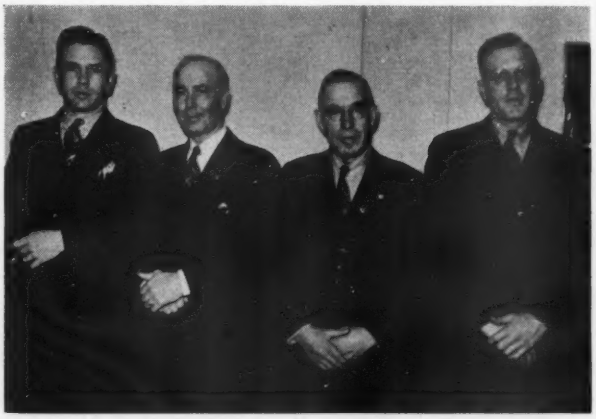
The Edison Electric Institute Medal was established by the Board of Trustees of the Institute during the year 1933 as an award to employees of member companies who have successfully resuscitated individuals suffering from electric shock, through use of the Schafer Prone Pressure Method. The award is intended to serve both as recognition of the performance of the act and to encourage and maintain interest in the training of employees in the use of the Schafer Prone Pressure Method of Resuscitation. A total of 79 awards have been made since the Medal was established.

A certificate describing the service rendered and signed by the President of the Institute is awarded with each Medal. In cases where a Medal has been awarded, a Certificate of Assistance is available to those who have rendered valuable aid in the resuscitation. Since the last presentation of Medals in February, 1938, a replica of the Medal has been prepared and in some cases this miniature medal has been given to line crews who have participated in cases of successful resuscitation.

Other Medals are pending presentation, while data on other cases are being considered by the Judges, Wills Maclachlan, 50 Oakwood Avenue, Toronto, Canada, Chairman.

In addition to their significance as well-merited tokens of humanitarian accomplishment, the Medals have a historical and sentimental value in that they have in their composition copper from the original mains laid down in New York City by the late Thomas A. Edison. This copper was part of the first underground distribution system in the world for supplying current for electric light and power.





Sommerville Line Crew: Morrill B. Munsey, James A. McInnis, Daniel S. McDonald and Burpee Coffill

The names of the recipients of the Medals and brief statements of the circumstances leading to the awards follow:

SOMMERVILLE LINE CREW
Massachusetts

On August 26, 1936, a line crew of the Boston Edison Company was changing wires from an old to a new pole at Arlington, Mass. J. McInnis and B. Coffill were working with Charles Schumann on one pole. D. McDonald, the foreman, and M. Munsey were on the ground. It was necessary for a wire on the adjacent pole to be cleared so that it could be pulled up. Schumann came down from the pole on which he had been working and proceeded to climb the other pole. After clearing the wire he decided to tie in other wires that had been pulled up. McInnis and Coffill on the adjacent pole and McDonald on the ground heard a gurgling sound from Schumann and saw that he was caught on the primary wire. McDonald ordered the primary wires cut and sent Munsey up the pole to keep Schumann from falling. Coffill then descended the pole and with a hand line assisted Mc-

Fred Woods

Donald and Munsey in lowering Schumann to the ground. Coffill then applied the Prone Pressure Method and in about five minutes Schumann regained consciousness. He received a second degree burn of the scalp and a third degree burn of left lower leg. He was removed to the Symmes Hospital in Arlington.

The Edison Electric Institute Medal and Certificate were presented by Mr. James V. Toner, Executive Vice-President and Treasurer to the Sommerville Line Crew, along with miniature Medals to Messrs. Munsey, McInnis, McDonald and Coffill, at a dinner on March 14, 1938, which was attended by some six hundred employees. Publicity was given to this presentation in the local papers.

FRED WOODS

Vermont

On July 24, 1937, at approximately 11 p. m., following a severe electrical storm, Newton I. Caldwell, a lineman employed by the Central Vermont Public Service Corporation, was working on a pole at Bradford, Vt. Upon discovering a blown transformer fuse, he lowered the fuse plug to his groundman, Fred Woods, who was at the base of the pole. He then unfastened his safety belt to swing around. In so doing his right arm, above the cuff of his rubber glove, came in contact with the wire of the 2300-volt transformer lead. Apparently, in an attempt to break the hold, Caldwell pushed away and being loosened from his safety belt, fell to the ground, a distance of approximately twenty feet. He was unconscious and Woods immediately started application of the Prone Pressure Method. After 15 or 20 minutes Caldwell showed signs of consciousness. Caldwell suffered a burn on his right forearm, just below the elbow on the inside, and was bruised and lame from the fall.

The Edison Medal and Certificate were presented to Mr. Woods on April 12, 1938, in Claremont, New Hampshire, at a meeting of company employees from the Bradford, Windsor, Springfield and Claremont divisions. There were approximately fifty employees present. The presentation was made by Mr. A. A. Cree, President of the Company.

W. J. HAWTHORNE

Washington

On Sept. 14, 1937, at 6:06 p. m., H. E. Baker, Distribution Power Superintendent, received an electric shock while using the telephone at the Craigmont Substation of The Washington Water Power Company at Craigmont, Idaho. The telephone system had been noisy the entire day and Mr. Baker and his crew were in the process of synchronizing two lines when the telephone circuit became charged, probably due to a ground in the metering current transformer in the plant. At the instant the line switch was closed, Mr. Baker was thrown off the insulating platform on which he was standing, striking his head on the concrete floor. He received an electric shock which rendered him unconscious.

At the time of the accident, W. J. Hawthorne, Lineman, was standing just outside of the substation building. Hearing Mr. Baker groan, he rushed inside and found Mr. Baker on the floor. Joe Dufour and George Sherman, employees of the company, assisted in carrying Mr. Baker out of the substation. While Hawthorne applied the Prone Pressure Method, Dufour, Sherman and J. R. Standley forced the patient's jaws apart, bathed his face and covered him with blankets. When the doctor arrived he ordered the patient removed to the hospital in an ambulance. Mr. Baker suffered a concussion of the brain and superficial skin burns on his thumb, fingers and palm of his left hand, on his mouth and left wrist.

Presentations of the Edison Medal and Certificate to Mr. Hawthorne, and Certificates of Assistance to Messrs. Dufour, Sherman and Standley were made on June 2, 1938, at a meeting held in the Lewis-Clark Hotel, Lewiston, Idaho. Mr. R. B. Childs, Assistant General Manager of The Washington Water Power Company, made the presentations.

L. F. Dickson

L. F. DICKSON

Texas

On July 15, 1937, at approximately 11:45 a. m., employees of the Vincennes Steel Corporation were working in the caisson pit at Montopolis Bridge which was being constructed near Austin, Texas. H. A. Rowe started to tighten some connections and came in contact with the 220 volt, 3 phase supply, receiving an electrical shock. In attempting to clear Rowe from the circuit, C. E. James and Elmer Hendricks received shocks. Hendricks was only slightly injured but James was unconscious when carried to the surface. Rowe fell into the bottom of the caisson and submerged in 25 feet of water. He was brought to the surface by foremen who were called to the scene.

L. F. Dickson, an employee of the Texas Power and Light Company, who had been making an extension of the neutral line for lighting to the caisson, applied the Prone Pressure Method to James. After about 20 minutes application James was able to

Waldrop Line Crew: R. L. Tinsley, W. S. Earnhardt, J. C. Waldrop, Vice-President M. C. Smith, Virginia Electric and Power Company, R. L. Rogers and C. C. Raymer

John Canady

breathe without assistance and was removed to the hospital, suffering from severe mental and nervous shock.

Mr. Dickson was awarded the Edison Electric Institute Medal and Certificate at a semi-public Safety Meeting at Taylor, Texas, Sept. 16, 1938. There were approximately forty employees of the company and twenty visitors present. The presentation was made by Mr. B. J. Korman, Fire Marshall.

J. C. WALDROP LINE CREW
Virginia

On July 26, 1937, at 1:15 p. m., a line crew of the Virginia Electric and Power Company was transferring 2.3 kv wires from an old to a new pole at Ashland, Va., when Henry B. Thomas, Lineman 1st Class, accidentally came in contact with an exposed wire. He received an electrical shock which rendered him unconscious. W. S. Earnhardt, a fellow employee, cleared him from the circuit and he was lowered to the ground where resuscitation was started by R. L. Tinsley. Due to the extreme heat of the sun, J. C. Waldrop, C. C. Raymer and W. S. Earnhardt took turns in resuscitating the patient, who was able to breathe without assistance in approximately 25 minutes.

Thomas received burns on right upper arm and left thigh and was removed in an ambulance to Grace Hospital in Richmond for treatment.

At a dinner at Rueger's Hotel in Richmond, Va., on the evening of July 22, 1938, the Edison Medal and Certificate were presented to the J. C. Waldrop Line Crew, with miniature Medals to Messrs. Tinsley, Earnhardt, Waldrop, Rogers and Raymer, by Mr. M. C. Smith, Vice-President of the company.

THOMAS B. SCOTT
Pennsylvania

On Nov. 18, 1937, T. B. Scott, C. Feagley and J. E. Cozzens were working on the installation of an automatic switch house at the Pennsylvania Edison Company's substation at Roxbury, Pa. Feagley and Cozzens were removing nuts from bolts on disconnect. Cozzens' wrench slipped, which turned him partly around in time to see Feagley come in contact with an energized U lead on the opposite side of the switch house. Apparently Feagley had tripped or slipped. Cozzens dragged him clear of the switch house and Scott at once began to apply prone pressure. Scott then instructed Cozzens to resume prone pressure while he telephoned for a doctor. In about three minutes Feagley began to breathe deeply and went into a convulsion which lasted about two minutes. He regained consciousness and was given first-aid by the doctor. Feagley was removed to the Chambersburg Hospital, suffering from burns on head and both great toes, and a cut on the forehead.

Mr. J. H. Shearer, President of the Pennsylvania Edison Company, presented the Edison Medal and Certificate to Mr. Scott at a testimonial dinner held at the Water Street Inn, Water Street, Altoona, Pa., on June 30, 1938, at which approximately one hundred and fifty employees were in attendance.

Thomas B. Scott

GALLIER CREW
Virginia

On Aug. 4, 1937, a line crew of the Virginia Electric and Power Company was working on a pole on U. S. Route No. 1 just north of Falmouth, Va. John A. Ayers was on a pole obtaining nameplate data from transformers for company records. He attempted to crawl through wires from one side of the pole to the other instead of coming down the pole and using ladders to reach the other side as instructed. He came in contact with the 13.2 kv circuit and was rendered unconscious by the shock. E. L. Tate, 2nd class Lineman, lowered him from the pole and Line Foreman, J. M. Gallier, immediately started application of the Prone Pressure Method. The line gang relieved

Gallier Crew: E. L. Tate, L. L. Martin, E. A. Cooper, J. M. Gallier, President G. J. Holtzclaw, Virginia Electric and Power Company, J. H. O'Bryhim, C. L. Sale and B. F. Aydlotte

A. L. Penniman, Jr., General Superintendent Electric Operations, Consolidated Gas Electric Light and Power Co. of Baltimore, William Wagner, C. E. Young and Milton G. Burns

Charles J. Weiler's Line Crew—Bottom row: Robert W. Longbine and Charles J. Weiler. Top row: Ralph F. Frame, John J. Lynch and Elinus Christiansen

one another in performing resuscitation for about 30 minutes when the patient was able to breathe without assistance. He was then removed to the hospital where he died about an hour later as the result of his injuries. He received a one inch burn on his head which penetrated his skull and third degree burns on right leg and foot.

The seven linemen of the Gallier Gang at Fredericksburg, Va., were awarded the Edison Electric Institute Medal for life saving, and the presentations were made by Mr. J. G. Holtzclaw, President of the Virginia Electric and Power Company, at a dinner given especially in their honor. The presentation was made in December, 1938. The linemen receiving the miniature Medals were: Messrs. Gallier, Martin, Cooper, Tate, O'Bryhim, Sale and Aydlotte.

JOHN CANADY

Arkansas

A 4 kv wire had fallen on a barbed wire fence on Roseville Road, three miles north of Paris, Ark. The fallen wire had set the grass on fire and the men fighting the fire had been warned not to touch the fence. E. M. Gipson, a laborer employed by the Dixie Fuel Company of Paris, was fighting the grass fire with a wet sack and came in contact with the charged fence. John Canady, a lineman employed by the Oklahoma Gas and Electric Company, who was working nearby, cut the wire and Gipson fell free of contact. He was unconscious and not breathing when Canady started resuscitation. He regained consciousness after about one minute and was removed to the hospital where he was treated for a small snag and burn between the fourth and fifth fingers of left hand, a small laceration on the fifth finger and an abrasion on the third finger of left hand and two small abrasions on the right hand.

On Dec. 17, 1938, at a meeting of eight hundred employees and their families at Fort Smith, Ark., the Edison Medal and Certificate were presented to Mr. Canady by Mr. E. G. Green, Educational Director of the Oklahoma Gas and Electric Company.

WILLIAM WAGNER

Maryland

On May 12, 1938, employees of the Consolidated Gas, Electric Light and Power Company of Baltimore were engaged in testing the bushings on the spare transformer at the Finksburg Substation. Wallace McWilliams had been working on de-energized switches and apparently made some mistake in the identification of equipment for he came in contact with the ungrounded overhead transmission line and fell off the switch structure. He was unconscious and not breathing when the employees who were attracted by the flash or arc reached him. William Wagner immediately applied prone pressure and in about three minutes the patient showed signs of life. Prone pressure was continued for about two minutes until the patient's breathing became regular. The doctor arrived in about 15 minutes and administered first-aid. McWilliams suffered third degree electric burns on right temple and sole of right foot, first and second degree burns on left temple, forehead, both hands, both knees and left foot.

On Thursday, Sept. 29, 1938, Mr. A. L. Penniman, Jr., General Superintendent, Electric Operations of the company, made the presentations at the regular monthly meeting of the Power Transmission Station's Department Safety Committee. The Edison Medal and Certificate were awarded to Mr. Wagner, and Certificates of Assistance to Messrs. Young, Jenezon and Burns.

CHARLES WEILER'S LINE CREW

Pennsylvania

On May 20, 1938, a line crew of the Philadelphia Electric Company, consisting of S. H. Hartley, R. W. Longbine, R. F. Frame, E. Christiansen and J. J. Lynch, under Foreman C. J. Weiler, were engaged in the reconstruction of 2.3 kv distribution

Charles J. Lake, Edward W. Stewart and Vice-President N. E. Funk, Philadelphia Electric Company

equipment at the top of a 40-foot wooden pole. At the time of the accident Hartley and Longbine were working at the pole top and Frame was working on the pole about 15 feet below Hartley. Hartley's shoulder came in contact with the short stub of an old primary tap. The arc attracted Longbine's attention and he shouted the alarm and climbed up over the pole top, attempting to clear Hartley from the phase wire with which he was in contact. To clear him it was necessary to lift the wire and push downward on Hartley, thus breaking the contact. Frame climbed up the pole and placed himself in position to apply pole top resuscitation. While Frame was applying pole top resuscitation, Lynch obtained a rope and blanket. He passed the rope to Longbine who secured it around Hartley's body. Frame stopped the resuscitation so that Hartley could be lowered to the ground. The pole top type of resuscitation was applied for about one or two minutes and when started Hartley was apparently dead. Before it was stopped the patient had begun to groan. As soon as his body reached the ground, Hartley was placed in the regulation prone pressure position and Foreman Weiler began to apply the Prone Pressure Method. He was relieved by Lynch and after about 10 minutes Hartley breathed without assistance. He was removed to the hospital where he was treated for shock and burns.

The Medal and Certificate were awarded to Charles Weiler's Line Crew on Aug. 31, 1938, by Mr. H. B. Bryans, Vice-President in Charge of Operations of the Philadelphia Electric Company. Miniature Medals were awarded to Messrs. Weiler, Frame, Longbine, Lynch and Christiansen.

CLAIRE HOWARD WEBSTER

Washington

While engaged in repairing a 2.3 kv regulator, on June 6, 1938, Earl L. Morse, an electrical mechanic employed by The Washington Water Power Company, Spokane, Wash., came in contact with a fuse holder energized at 2300 volts. The path of the current was from the right side of his head through the body to his left hand which was on the frame of the regulator.

His co-worker, Claire H. Webster, immediately freed him from the circuit by using a broom handle, and finding that he was unconscious and not breathing, applied the Prone Pressure Method of resuscitation. After fifteen minutes the patient was able to breathe without assistance and was removed to a doctor's office for treatment of burns on the hand and head.

The presentation of the Edison Electric Institute Medal and Certificate was made at a meeting of a divisional Safety Committee held at Colfax, Wash., on Oct. 25, 1938, at which forty employees were present. Mr. John Fisken, Consulting Engineer of the company made the presentation.

EDWARD W. STEWART

Pennsylvania

At about 3:55 p. m. on July 8, 1938, Edward W. Stewart and Charles J. Lake of the Philadelphia Electric Company, Philadelphia, Pa., were conducting tests on equipment in the Department of City Transit—McKean Substation No. 8, Watts and McKean Streets, Philadelphia, Pa. At the time of the accident they were using a portable Kenotron Test Set with the wires running to the equipment to be tested. Precautions were taken to rope off and properly mark the danger zone, but in spite of this, Thomas Markey, an employee of the W. V. Pangborne Company, Inc., attempted to cross the roped-off space and came in contact with the energized wires from the Kenotron Set.

Lake observed that something was wrong and immediately shut off the Kenotron test apparatus and Markey fell clear of the energized wire. Stewart immediately went to Markey's assistance to start the Prone Pressure Method of resuscitation, but found it difficult to start the prone pressure due to the fact that the victim was very stiff; thereupon, Lake assisted Stewart in preparing Markey for the proper position for efficient operation of the Prone Pressure Method.

Stewart worked on Markey for about ten minutes before he showed some signs of life and continued to apply the prone pressure for another ten minutes, by which time an ambulance with an interne from St. Agnes Hospital arrived. The interne examined the victim and found that he had sufficiently recovered to be removed to the hospital, where has was treated for electrical shock.

The Edison Medal and Certificate were presented to Mr. Stewart, and a Certificate of Assistance to Mr. Lake, Jan. 30, 1939, by Mr. N. E. Funk, Vice-President in Charge of Engineering of the Philadelphia Electric Company.

Henry M. Atkinson

HENRY M. ATKINSON, chairman of the board of the Georgia Power Co. and for more than forty years a leader in the industrial progress of Georgia, died in Atlanta, January 21, after a long illness. He was 76 years of age.

Mr. Atkinson devoted his abilities and fortune to public undertakings which contributed to the industrial and educational development of the community and his services in the electrical development field have been particularly valuable. He was the leader of the enterprise which resulted in Atlanta's having its first electric lighting system in 1891. He was the first president of the Georgia Electric Light Co. and was an important factor in the consolidation of the City Railways & Lighting Cos. of Atlanta into the Georgia Railway & Electric Co. In recognition of his services to the company Georgia Power named its plant on the Chattahoochee River the Atkinson steam plant.

A native of Brookline, Mass., and a graduate of Harvard University, Mr. Atkinson was engaged in the cotton business in Atlanta, later entering the banking field, serving as an executive of a number of institutions before he began his work in the utility field.

Prize Winners in Customer Benefits Contest

(*Continued from page* 46)

light and power companies and was planned to mobilize and interpret the numerous advantages of purchased power for the customer or prospective customer in terms of Customer Benefits as they might affect the customer's business. The contest was sponsored by Reddy Kilowatt, through the medium of his originator, Ashton B. Collins, Webb Crawford Building, Birmingham, Ala.

In commenting on the contest the judges said: "The assignment of definite value to the many advantages inherent in power company service, with particular emphasis on such items as economy, flexibility and convenience, is of especial importance at this time. The industry has long recognized the necessity of evaluating all of these advantages from a customer viewpoint. The many ideas contained in the papers submitted in this contest should serve to crystallize the thinking of power salesmen and the customer advantages developed in the papers will be useful in both oral and written sales presentations, as well as in the development of sales training material."

The judges, in accordance with the optional provisions of the contest and with the concurrence of Mr. Collins, have recommended that the papers be referred to the Industrial Power and Heating Committee of the Edison Electric Institute, J. F. Gaskill, chairman, for such use as the committee may feel will be of most value to the industry.

Electrical Equipment Committee Meeting

H. L. Wallau, *Chairman*

THE mid-winter meeting of the Electrical Equipment Committee was held at the Hotel Statler, Buffalo, New York, February 6 and 7. At this meeting there were present about 25 members, with 17 guests attending the closed session and 22 attending the open session.

Monday morning was devoted to a closed session, where Oil Fire Experience, Equipment Failure, Oil Circuit Breaker Performance, Oil Bushing Performance, and other operating problems were discussed. At this meeting Mr. R. S. Fleshiem of the Allis-Chalmers Manufacturing Company presented a detailed discussion of the present status of the development by his company of d-c transmission. Mr. Fleshiem pointed out recent developments in the art which influenced this problem, and the limitations of its application, due to cost factors. He also developed the problems still remaining to be solved, and pointed out that a large scale field trial would aid substantially in the ultimate solution of some of these problems, and that further development in the art might make its application economical in certain specific instances.

At the present time there does not seem to be a field for d-c transmission within the economic limits of load and distance of a-c transmission.

Under the sponsorship of the Station Design Group, a paper was presented by Mr. Wilbraham, describing rebuilding of the Christiana Substation; a paper by Mr. Henry, describing the Seneca Substation; and a paper by Mr. Wood, describing the electrical features in connection with the rebuilding of the Louisiana Steam Generating Station.

The subject group on Generator Insulation reported active work, and that some progress was being made in this study. However, up to the present time no non-destructive tests have been developed which will definitely show the condition of the electrical insulation on a generator.

The report of the Meter and Service Subcommittee pointed out that in addition to the standardization of the self-contained meter, the Subcommittee had now completed work on standardization of low voltage current transformers and on standardization of dial constants. This outstanding and important work is described in detail in an accompanying article.

Mr. Oday, of the General Electric Company, at the invitation of the committee, described some of the factors of interest in connection with the development of fluorescent lighting. Due to the necessity of a ballast impedance in series with the mercury arc of the fluorescent light, these units as developed to date have an inherently low power factor. Since fluorescent light, in white or daylight, has only about twice the lumens per watt efficiency of an ordinary Mazda lamp, and operates at about 60 per cent power factor, a lighting installation using these units would create an equal demand on the interior wiring system and on the utility system for an equal intensity of light. For a higher intensity of light the demand on the utility system, and the demand on the interior wiring system would be correspondingly greater. In order to assist in the solving of this difficulty, capacitors have been developed for installation with groups of lights and also with individual lights. It appears that the installation of a capacitor for a group of units would in general be much more economical than the installation of the individual capacitor units. Also, control units for operation of lights in pairs where one light is controlled by a reactor ballast and the other by a capacitor ballast, have been developed and will operate at approximately unity power factor.

Mr. Oday pointed out that the lamp manufacturers considered the fluorescent lamp as primarily a product for use where special effects of color were required, or where daylight quality was desired. They did not believe that there would be an appreciable replacement of incandescent lighting with fluorescent lighting, due among other things to the cost of installation. At the present time the annual production of filament lamps is about one-half billion and the expected production of fluorescent lights for the current year is between one and three million. In five to ten years it is expected that the annual production will increase to ten million units, and that the filament lamp production will increase to 650,000,000 units.

Dr. Vitalis, of the Philadelphia Electric Company, presented a paper pointing out factors in accident prevention which might be taken into account in design, in connection with accident prevention. From a psychological standpoint, in connection with accident prevention, it is important to use readily distinguishable symbols and signals so that they can be observed and register without conscious effort. For instance, he pointed out that signs of different shape and different color were more effective in distinguishing pieces of apparatus than similar signs merely carrying a different designation. Different color paint on different apparatus aids in a quick size-up of the situation.

The next meeting of the committee will be held at the Edgewater Beach Hotel, Chicago, Illinois, May 1 and 2.

Prime Movers Committee Meeting

W. E. Caldwell, *Chairman*

A MEETING of the Prime Movers Committee was held in Pittsburgh February 6 and 7, at the Hotel William Penn. According to the custom of the committee, this third meeting of the current year was devoted largely to a review of the material prepared for the several annual progress reports. Among the reports considered were those on Boilers, Combustion, Pulverized Fuel, Combustion Control and Dust Collection, as well as preliminary discussions on forthcoming reports dealing with Turbines, Metallurgy for Power Plants, Condensers and the operating records of the newer high pressure boilers and turbines.

An announcement was made that the special issue of the Standards on Piping Materials of the American Society for Testing Materials is now available. This is a compilation of the standards with particular relation to High Temperatures and High Pressures, published in response to a request from and in cooperation with, the Prime Movers Committee. Copies may be obtained by member companies from the ASTM at $1.00.

Among the subjects discussed were recent operating troubles with the new high pressure turbines and the subject of governor operation in combined hydro and steam stations. As usual, the round-table discussion of operating problems was a prominent and useful feature of the meeting.

The next meeting will be held in Chicago, May 1 and 2, at the Edgewater Beach Hotel. This will be the spring general meeting of all of the engineering committees of the E.E.I.

Transmission and Distribution Committee Meeting

H. P. Seelye, *Chairman*

NUMEROUS papers and discussions on distribution and transmission problems of current interest and importance were heard at the meeting of the Transmission and Distribution Committee held at the Sagamore Hotel, Rochester, N. Y., February 9-10.

The Underground Group sponsored a meeting of the Subject Committee on Underground Methods and Accessories on February 8. The forenoon session was devoted mainly to the presentation of prepared papers and discussions while the afternoon was given over to a round table discussion of underground and cable problems. The attendance at this meeting was approximately 50. The following presentations were made:

1. Considerations in Network Transformer Manhole and Vault Design; Combination Lock for Grounding Switches, by T. D. Reimers of the Consolidated Edison Co. of N. Y., Inc.
2. Operation of AC Low Voltage Network from Two Voltage Sources, by W. B. Kenyon, Rochester Gas & Electric Corp.
3. An AC Low Voltage Network Served from Two Stations and Two Voltages, by Mark Eldredge, Memphis Power and Light Co.
4. Network Voltage Studies, by M. W. Ghen, Duquesne Light Co.
5. Recent Developments in Cable Fault Locating, by J. A. Vahey, Boston Edison Co., presented by W. B. Elmer.
6. Network at Union Pacific Headquarters Building in Omaha, by C. W. Minard, Nebraska Power Co.

The forenoon session of the Transmission and Distribution Committee meeting, February 9, was given over to the presentation of two papers relating to the recent New England hurricane and sponsored by the Overhead Distribution Group, and to a symposium on Transformer Tank Corrosion sponsored by the Underground Group. Papers prepared by T. H. Haines of the Boston Edison Co. and C. M. Yale of the Hartford Electric Light Co. set forth in considerable detail the steps taken in restoring service following the hurricane that passed through New England last September. This is generally recognized as one of the most disastrous storms to overhead lines that has taken place in this country for many years and the suddenness with which it struck the New England states made necessary the assembly of crews and materials on a basis that could not have been anticipated under the storm conditions which this part of the country might have expected. These papers presented in excellent manner the steps which the authors' respective companies, as well as other companies in that territory, were compelled to take in order to clear the streets of trees and debris prior to the necessary restoration of lines and service.

The symposium on Transformer Tank Corrosion consisted of papers by:

W. W. Satterlee, Westinghouse Electric & Manufacturing Co.

E. D. Treanor, General Electric Co.

H. S. Phelps and J. A. TenBrook, Philadelphia Electric Co.

T. D. Reimers, Consolidated Edison Co. of N. Y., Inc.

These papers treated different aspects of the corrosion problem, relating experience, describing methods that had been attempted, and research that is under way to increase the life of transformer tanks that are subject to corrosive effects.

The session on the afternoon of February 9 was devoted to a symposium on distribution transformer loading, a report of the Cooperative Projects Group and a discussion of the status of the various Suggestions for Specifications that are under study and consideration by the Standards and Specifications Group. The symposium on distribution transformer loading consisted of a discussion by F. E. Sanford of the Cincinnati Gas & Electric Co. under whose supervision this study is being made. Papers were given by W. E. Groves of the Detroit Edison Co. on Transformer Load Determination and by J. A. TenBrook and L. R. Gaty of the Philadelphia Electric Co. on Load Testing Methods. This is a continuation of a study that was undertaken some two or three years ago and which has resulted in the publication of two reports, E.E.I. Publication F-3 "Distribution Transformer Load Characteristics" and F-7 "Economical Distribution Transformer Loading and Thermal Performance of Distribution Transformers."

Several projects that are of concern to other committees were reported upon under the Cooperative Projects Group by M. D. Hooven and an account of the Chicago Accounting Conference was given by A. A. Lipschutz of the Philadelphia Electric Co.

An interesting discussion was held by the Standards and Specifications Group on the subject of Distribution Transformer Standardization. This is a project that is being handled by a Joint E.E.I.-NEMA Committee under the supervision of A. E. Silver, Chairman of the E.E.I. representatives on this joint committee. Mr. Silver described efforts made thus far in securing from operating companies throughout the country their desires as to distribution transformer standardization, particularly with regard to methods of mounting, the omission of taps, and various other mechanical features. The objective of this study is to bring about for the smaller sizes of distribution transformers at least, methods of mounting which will make the various makes of transformers interchangeable and the omission of various mechanical design features, all of which it is expected, will result in lower manufacturing costs and therefore lower cost for transformer installations.

The forenoon session of February 10 was a closed session at which various subjects were discussed by power company engineers. No prepared papers or discussions were presented during this session although a report was made on a project that had been undertaken since the last meeting relating to street lighting practices. During the afternoon session on February 10, a report was given on the various subjects that fall under the sponsorship of the Plant Coordination Group. The proposed regulations governing the location of structures in and about airports were briefly discussed. Reports on several other items falling under the Plant Coordination Group were made.

The meeting closed with the presentation of motion picture films showing the construction of a 132-kv wood pole transmission line in the vicinity of Toledo, Ohio, and brief discussion of various problems involved in wood pole transmission work. An interesting feature of this session was the presentation of an illustrated paper by Mr. Ben Hughes on the design and manufacture of various types of H-frame structures for wood pole transmission lines.

Through the courtesy of the Rochester Gas & Electric Corp., and various insulator manufacturing companies whose factories are in the vicinity of Rochester, arrangements had been made whereby those who could arrange to do so might visit the insulator factories in operation at their convenience. Arrangements were also made for those who cared to do so to visit the plant of the Eastman Kodak Co. and the plant of the Bausch and Lomb Co.

Canadian Electrical Association Winter Conferences

THE Canadian Electrical Association recently held its Annual Winter Conferences in Victoria, B. C., for members resident in Western Canada, and in Montreal for those resident in the East.

The Mid-Winter meeting of the Western Section, held at Victoria, Dec. 8-9, was a complete success, with over 100 delegates registered.

Papers heard during the sessions included the following:

"Publicity as an Aid to Sales of the Electric Utility"
"Profitable Load Building with Appliances"
"Record Keeping for Distribution System"
"Adequate Wiring"
"Some Economic Aspects of Power Factor Correction"
"Industry Co-ordination Through Medium of Electrical Service League"
"Some Observations of a Purchasing Agent"
"The Fundamentals of Rate Making"
"Public Relations from the Employees Standpoint"

A slide film illustrating Employee Education was also shown and a paper on Lighting was read which was illustrated by a slide film in technicolor.

Mr. Gilman, President of the Association, addressed the delegates and took for his subject "The Canadian Electrical Association" in which he told of the Association's scope and aims, how it has helped to knit our electrical industry together and how it can be of even greater value to our industry in the future.

Eastern Meeting

The Sixth Annual Winter Conference of the C.E.A. Committees was held in the Windsor Hotel, Montreal, on Jan. 16-17. Nearly 300 delegates registered during the two-day meetings.

All Committees met during the first day under their respective chairmen and discussed matters of interest to each particular group.

Accident Prevention: This Committee discussed Body Belts; Climbers and Hooks; Rubber Gloves; Goggles; Grounding; Protection; Resuscitation; Reporting of Accidents and other matters of interest to this group.

Kitchen & Laundry Appliances, Electric Housewares, Dealer Relations, Advertising and Commercial Sales Committees: These committees met as a group and their discussion was of such interest to those taking part that the meeting lasted the full day. Items under discussion included Electric Ranges, Water Heaters, during which it was decided to make an effort toward standardization of sizes; Refrigerators, with an interesting discussion on sizes, prices and length of time payments; Kitchen Planning; Home Service; package sales of small appliances; importing of low-priced radios; commercial cooking and methods for the development of this load.

Hydraulic Power Committee: This committee discussed Turbine Vane Greasing; Flow Meters; Turbine Bearings; Rack Rakes and Bushing Materials.

Industrial Power & Heating Committee: This committee discussed the replies to a questionnaire which had been previously submitted to member companies dealing with competitive power, welding, publicity, contact with customers, etc.

Metering Equipment Committee: This committee's activities were fully discussed and included standardization of meter terminal connections and instrument transformers; Codes as affecting the activities of this Committee; service entrances and voltages; use of 15 amp. meter and testing regulations.

Rural Service Committee: This committee discussed the "Advisability of Utilities Employing Agricultural Engineers to Promote Rural Load Building." Instances of the satisfactory results achieved by utilities who have adopted this plan were cited.

Customer Relations Committee: This committee discussed questions relating to employee training and their effect on customer relations and arranged for the showing of certain sound slide films produced by Vocafilm Corporation, for the general session held on the second afternoon.

This Committee also met with the *Rate Structures* Committee, at which time a paper was read entitled "Are Rates Customer Irritants?" followed by a full discussion of the subject of rates as affecting customer relations, by the members of both committees.

The Lighting Committee discussed preliminary reports for the Annual Report covering the subjects of recent developments in lamps and lamp statistics, residential, commercial, industrial, street and highway lighting; polarized light and the Illuminating Engineering Society, of which many of those present are members. This Committee also presented an exhibition of "before and after" photographs, depicting Canadian lighting installations.

Items of interest to the *Motor Vehicles Committee* included anti-freezes on which a special paper was presented; standard designs for trucks and equipment; oil filters; speed governors, etc.

Discussion of the *Wiring Committee* was devoted almost entirely to the proposed 4th Edition of the Canadian Electrical Code, Part I (Inside Wiring Rules) which includes many revisions to the present code of interest to utilities. The activities of the Adequate Wiring Bureau was also discussed by the members.

The meeting of the *Overhead Systems Committee* was attended by a record number. The various sub-committees reported as follows:

Rural Line Construction are gathering data on rural line practices.

Standards for Pin and Insulater Threads will soon be issued covering lead tip pins. Wood pins will not be considered at this time.

Railway Crossing Specifications will soon be passed on to the C.E.S.A. Panel on Outside Wiring Rules for letter ballot.

Grounds and Grounding problems were discussed and a recommendation will be made for the creation of a Committee to handle this subject only.

Pole Treatment for New and Standing Poles was reported on and progress noted. The Forest Products Laboratories in Ottawa are lending valuable assistance in this regard.

Expulsion Gaps for Lightning Protection; Dancing and Galloping Conductors; Loading and Fusing of Distribution Transformers; Radio Interference and Conductor Separations were other subjects discussed.

The Systems Co-ordination Committee discussed Ground Resistances; Interference to Pilot Wire Systems; Joint Use and Radio Co-ordination.

The Underground Systems Committee heard discussion on the subjects of various alloys used as sheaths; cable pressures in compound filled cables employing oil filled joints; buried cable using block protectors; the use of multi-taps for secondary joints and other matters.

The Electrical Equipment Committee discussed and heard interim reports on Testing Insulation and Rehabilitation of Circuit Breakers in addition to discussing methods for improving Generator Cooling; Operating Temperatures for Electrical Equipment in which the subject of the use of glass tape for insulation for generators and rotating machines was introduced; the design and construction of substations and standardization of transformer bushings up to and including 46 kv.

The Power Systems Engineering Committee discussed and will prepare reports on the use and experience with Gas Protector Relays in Canada; problems and results of interconnections between several larger power companies in the province of Quebec; routine inspection of system equipment; service data on automatic reclosing H.V. lines and the subject of counterpoise from the service and system standpoint.

The above Committee meetings were attended by nearly 300 delegates who were welcomed at luncheon by the Association's President, Maurice C. Gilman, General Sales Manager, Winnipeg Electric Company.

Mr. Gilman also spoke at the dinner held on the first evening and reported upon the Western Conference which he had attended in Victoria in December last.

The second day of the Conference was devoted to meetings of two groups of Committees—the first, embracing all the Commercial committees was addressed by C. E. Greenwood, Commercial Director, Edison Electric Institute who spoke on "Commercial Activities in the Institute" during which he outlined E.E.I. Committee activities and those of the national promotional plans such as Better Light, Refrigeration, Running Water, Adequate Wiring and the Modern Kitchen Bureau.

Much valuable discussion followed Mr. Greenwood's remarks and it is felt

that more Canadian utilities will make use of the various programs of the Institute as a result. It is realized that these may only be as plans which will have to be changed to meet Canadian conditions but will be, nevertheless, of great assistance to our member companies.

The second group—composed of Technical committees heard several interesting papers which aroused keen discussion. These included:

"Capacitors as Applied to Distribution Circuits," by J. W. Butler, General Electric Co., Schenectady, N. Y.

"When You Can Measure"—a sound film.

"Design and Operation of an Automatic H.V. Line Fault Locator," by E. W. Knapp, Shawinigan Water & Power Co., Montreal.

"Increasing the Capacities of Turbines in Existing Settings," by H. S. Van Patter, Dominion Engineering Co., Ltd., Montreal.

The second afternoon was set aside for a general session of all delegates and included a sound-slide film on training employees and an address on Public Relations entitled "The Job That Never Ends" by Wm. J. Cairns, Assistant Vice-President, The Bell Telephone Co. of Canada.

Another paper of interest at this session was presented by W. R. McCaffery, Secretary, Canadian Engineering Standards Association on "Standardization and Its Relation to the Electric Utilities Industry."

Col. McCaffery outlined the status and functions of his organization and then went on to speak of the various codes, specifications and standards which affect the utility industry and asked for closer co-operation between the two associations, outlining the progress which has been made in this regard during the past year or so.

The meeting closed after the showing of moving pictures (in color) of the 1938 C.E.A. Convention.

The Annual Convention will be held at "The Pines," Digby, Nova Scotia, June 21-24, 1939.

Distribution Transformer Load Testing Methods

(*Continued from page 62*)

the year well in advance of the peak load season. We do not intend to calculate transformer loadings from this data. Last year we attempted to calculate demand factors which could be applied to customers' kilowatthour consumption, taking into account the number of electric ranges, etc. on the thirty transformer locations on which we had located the recording meters mentioned earlier in this paper. We were unable to arrive at any consistent results. This was especially so in the heavier loaded areas where with our banked transformers it was quite difficult to allocate the customers to the proper transformers. We still believe that this method might be worked out with quite some degree of success in the towns and villages of the suburban area where the living habits of the townspeople are, to a much greater extent, more similar than those of their urban neighbors.

The methods of securing transformer load data in our Eastern Michigan or suburban area are quite similar to those employed in the Detroit District, except that only about 15 per cent of the transformers are load tested. A large percentage of the transformers in this area are on farm lines or in sparsely settled small farm subdivisions and serve only one, two, or three customers. The local engineer each year designates the transformers on which he desires load tests. The cost of the tests in the suburban area is about 20 per cent higher for spot tests, 13 per cent higher for tests with the Lincoln meters in the wooden boxes, and about 6 per cent higher for the Maximeter tests, compared with similar tests in the Detroit District. The increased cost is due to the more scattered location of transformers, longer driving distances to the day's work, and unpaved and ungraveled streets may necessitate much walking and carrying of test equipment. These conditions are accentuated on the spot tests due to the work being done in the darkness, resulting in fewer tests per day. Since the transformers in the suburban areas are not banked, they are not equipped with secondary fuses, and it is necessary to untape and disconnect the transformer training wires to install the Lincoln meters in the wooden boxes. This accounts for part of the increased cost of this type of load test, although the work is performed in the daytime. The Maximeter costs show the least increase because the work and all driving is done in the daytime and the meters are installed in the same manner as in the Detroit District.

As soon as the test crews have completed the load tests on the single-phase lighting transformers, we proceed with the job of spot testing and inspecting the three-phase transformers serving commercial power load.

These test loads are recorded in our three-phase transformer card file which has a card for each three-phase transformer or group of transformers on the same platform. These cards also carry the names and addresses of all customers served by the transformer as well as a detailed record of their connected motor load. The size of the transformer is established by a study of the test load and the connected load. In cases where we suspect overload or underload, the spot test may be followed up with a one or two day recording ammeter or demand meter test on the transformers before increasing or decreasing transformer capacity. The connected load data is kept up to date by an actual visit and check-up of motors on the customer's premises by two non-technical field men who work at this job part time more or less continuously the year round.

Last year we load tested 3,300 three-phase and open-delta transformers and checked up the connected motor load of 5,300 three-phase power customers for a total expenditure of approximately $7,000.00, or an average cost of $2.12 per transformer. As a result of this check-up, we removed or reduced the capacity of ninety transformer installations by 2,060 kva, releasing $18,000.00 worth of three-phase capacity for use elsewhere on the system. We also found fifty-nine locations where the existing transformer capacity was overloaded or had too much connected load for solid comfort, endangering some 2,000-kva capacity or $20,000.00 worth of transformers. This condition was remedied by adding 1,550-kva capacity or $8,600.00 worth of transformers at these latter locations.

We feel that it is essential that the field engineer who is responsible for the transformer loading should have all of this information at his fingertips and that the information should be as accurate as possible. If he has confidence in it, he will conserve on transformer capacity but, if he considers the information as doubtful, he will certainly be too liberal and install a lot of excess transformer capacity. We make probably five hundred shifts a year of transformers serving power load, and it can be seen that being a little too liberal when installing new or additional capacity could easily increase the transformer investment $25,000.00 to $40,000.00 per year.

Notes on Coming Meetings

Pennsylvania Electric Association—Operations Section

A meeting of the Operations Section of the Pennsylvania Electric Association will be held at the Benjamin Franklin Hotel, Philadelphia, March 1 and 2. The morning session on March 1 will be devoted to discussion of supervisory training activities. Speakers at this session include William Conover, U. S. Steel Corporation of Delaware; R. D. McKinnis, Duquesne Light Company and H. K. Breckenridge, West Penn Power Company. A concurrent meeting of the Motor Transportation, Accident Prevention and Stores Committees will be held the afternoon of the same day.

Customer relations will hold the spotlight at the forenoon session, March 2. The principal speakers for this session are Elmo Roper, Consultant and Henry R. Flanegan, Philadelphia Electric Company. Briefer talks will be made by representatives of a number of companies.

For the afternoon of March 2, arrangements have been made for those attending the meeting to witness various operations and training programs, visit plants and discuss problems with members of the Philadelphia Electric Company.

Luncheon meetings will be held on both days.

Northwest Association

The annual sales stimulus in the Pacific Northwest will be presented at the 14th Annual Meeting of the Business Development Section, Northwest Electric Light & Power Association, at Portland, Oregon, March 16-18, 1939. Headquarters will be at the Benson Hotel.

W. A. Huckins, Utah Power & Light Co., chairman of the Section, announces three general sessions at which Franklin T. Griffith, President, Portland General Electric Co.; LeRoy A. Grettum, Manager, Eastern Oregon Light & Power Co., and president of the Association; C. A. Eastman, Ebasco Services, Inc.; and Ashton B. Collins of Reddy-Kilowatt fame, will be heard. Negotiations are in progress with other speakers for these sessions.

The other two half-day periods will be taken up by Bureau and committee conferences.

CONVENTIONS AND MEETINGS

FEBRUARY

5-10 National Electrical Manufacturers Association, Waldorf-Astoria Hotel, New York, N. Y.
6-7 Electrical Equipment Committee, EEI, Statler Hotel, Buffalo, N. Y.
6-7 Prime Movers Committee, William Penn Hotel, Pittsburgh, Pa.
9-10 Transmission and Distribution Committee, EEI, Sagamore Hotel, Rochester, N. Y.

MARCH

1-2 Pennsylvania Electric Association, Operations Section, Benjamin Franklin Hotel, Philadelphia, Pa.
13-14 Wisconsin Utilities Association, Technical and Commercial Divisions, Pfister Hotel, Milwaukee, Wis.
16-18 Northwest Electric Light and Power Association, Business Development Section, Benson Hotel, Portland, Ore.
20-24 Annual Sales Conference Edison Electric Institute, Edgewater Beach Hotel, Chicago, Ill.
24 Annual Power Sales Conference Edison Electric Institute, Edgewater Beach Hotel, Chicago, Ill.
30-31 Southeastern Electric Exchange, Ponce de Leon Hotel, St. Augustine, Fla.
30-31 Missouri Valley Electric Association, Rural Sales Conference, Kansas City, Mo.

APRIL

1 Southeastern Electric Exchange, Ponce de Leon Hotel, St. Augustine, Fla.
3-4 Oklahoma Utilities Association, Tulsa Hotel, Tulsa, Okla.
6-7 Missouri Valley Electric Association, Engineering Conference, Kansas City, Mo.
12-14 Missouri Association of Public Utilities, Muehlebach Hotel, Kansas City, Mo.
14 Maryland Utilities Association, Lord Baltimore Hotel, Baltimore, Md.
27-28 Missouri Valley Electric Association, Accounting Conference, Kansas City, Mo.

MAY

1-4 Engineering Committees, Edison Electric Institute, Edgewater Beach Hotel, Chicago, Ill.
2-4 Chamber of Commerce of the USA, Washington, D. C.
8-12 National Fire Protection Association, Chicago, Ill.
14-18 National Electrical Manufacturers Association, The Homestead, Hot Springs, Va.
21-25 National Electrical Wholesalers Association, The Homestead, Hot Springs, Va.
26-30 Westinghouse Agent-Jobbers Association, The Homestead, Hot Springs, Va.

JUNE

5-9 EDISON ELECTRIC INSTITUTE, Waldorf-Astoria Hotel, New York, N. Y.

OCTOBER

2-6 National Restaurant Association, Chicago, Ill.
Wk. Oct. 2nd—Third Annual Conference, Commercial Electric Cooking Council, Chicago, Ill. (*date to be announced*).

Maryland Utilities Association

The Annual Spring Meeting of the Maryland Utilities Association will be held at the Lord Baltimore Hotel, Baltimore, April 14, 1939.

Three meetings will be held in the morning, one each for the electric, gas and transportation groups. Officials from utility organizations will speak at each of these meetings. A luncheon will be served after the morning meetings, followed by a combined meeting of the three groups.

Oklahoma Utilities Association

The Annual Convention dates of the Oklahoma Utilities Association have been changed to April 3-4, since another convention meeting previously announced would conflict with the March 20-21 dates. The meeting will be held at the Tulsa Hotel, in Tulsa, Oklahoma.

Mr. R. W. McClure, President of the Oklahoma Power and Water Company, Sand Springs, Oklahoma, was re-elected Chairman of Electric Light and Power Division of the Oklahoma Utilities Association at the January Board meeting.